The Builder.

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The Larger Buildings of the Chicago Exhibition (concluded).

THE mining building, by Mr. S. S. Beman, of Chicago, is situated to the west of the Electricity Building, and has its major axis running north and south, the southern façade facing the central court. It occupies an area of 350 ft. by 700 ft., and is principally interesting in that the cantilever system, so generally employed in bridge construction, has been employed here in the construction of the roof to the main nave and aisles. It is the only example of this in the Exhibition, and it is said to be the first application of this ancient principle of construction for the purpose of supporting a roof covering, at any rate on so large a scale. The plan consists of a nave 115 ft. from centre to centre of steel stanchions, with an aisle 57·6 wide on each side. From the steel stanchions which separate the nave and aisles, the roof of the aisles is cantilevered over in the nave for a distance of 34 ft. 6 in. on each side, the upper part of the lattice work truss being, of course, in tension and secured to the outer chord of the aisle roof, which is secured to the outer standards. The roof slopes down in one continuous line from the upper end of these cantilevered trusses over the side aisles. The space, 46 ft. wide, thus left in the centre of the nave is spanned with rivetted steel trusses, joined to the ends of the cantilevers and having an elliptical lower chord, the upper part being raised to form a clearstory for lighting purposes. This central nave and aisles are in one height only and around this space are placed galleries in two heights, lighted from windows in the façades, the upper floor being additionally lighted by a raised central clearstory. This outer ring of galleries is supported entirely by columns of wood, and is covered with wooden-framed roof. The entrances are arranged in the centre of each façade, those on the north and south being the most important, and these are recessed. On either side of these four entrances are wide staircases leading to the gallery floors. The exterior of the building is, like the other main structures of the exhibition, composed entirely of "staff," and is treated in a massive way, as it were, to bring out the expressive qualities of mining. The main cornice is 60 ft. high from the ground, as in the other buildings fronting on to the Great Court, and is supported on the main fronts by massive rusticated piers, corresponding with the internal divisions of the plan, and crowned with sculptured heads which act as a base for the flag-poles which crown them.

The principal fronts have semi-circular arched entrances, with sculptured figures in the spandrels and pediment, emblematic of mining and its allied industries. On either side of this central entrance is arranged a recessed loggia 25 ft. wide in two stories, the upper one corresponding with the gallery floor level from which it is reached. At each end of these fronts, at the point where the surrounding two-storied aisles intersect, low domes are formed and crowned with a small gilded lantern. A decided French spirit pervades the whole of the exterior design, and is manifested in the carving to the main frieze, in the treatment of the piers to the main entrance, with their escutcheons, and in the carving to the spandrels. The ornamentation throughout is scarcely bold enough to harmonise with the massive phase of architecture adopted. There is practically no sculpture properly so called, nor has any scheme of colour decoration been employed, as in most of the other large buildings. As for the interior, we have mentioned the somewhat novel employment of the steel cantilever trusses, and the awkward and abrupt line caused by the termination of the cantilever on each side, thus stopping the grand sweeping curve of the truss. This is all the more noticeable because we are accustomed to see the principals in these roofs extend without interruption from one side to the other. It is perhaps only on account of this reason that it is displeasing, but it certainly gives a broken line which destroys the homogeneity of the design. All credit is, however, due to Mr. Beman for his employment of a novel feature such as this in his design, and there is certainly a character and feeling about the whole composition which makes it peculiarly suitable to the purpose for which it is designed.

The Transportation Building, by Messrs. Adler & Sullivan, of Chicago, is in many respects the most remarkable and interesting on the grounds. The architects are well known as the designers of the Auditorium Theatre and Hotel, the Schiller Theatre, and other tall buildings in Chicago. The interest, however, in this case, does not come from any new development in construction, as in the buildings referred to, but simply because the building has been designed from the very beginning as a colour scheme, pure and simple. As to architectural features, as we understand them, there are none, the façades, with the exception of the great central doorway on the east front, consisting of flat plaster surfaces upon which the painting has been directly applied.

In regard to plan, the uses to which the building had to be put very naturally exercised a considerable influence in its development. In this case the architects had to consider the most convenient handling of heavy engines on rails which were to be placed transversely to the main axis of the building. They found that 16 ft. for each pair of rails allowed sufficient circulation for the public to inspect the exhibits, and by grouping these in pairs, 32 ft. was obtained as a module upon which the plan was laid out. The building itself is 960 ft. by 250 ft. and consists of a main nave 96 ft. wide, around which are placed two-storied aisles. The nave walls are carried high above these aisles and contain clearstory windows, lighting the nave and giving sufficient light for large exhibits, such as balloons and the like, which are illustrative of transportation.

Staircases for access to the galleries are arranged at each end and at the great entrance on the east side facing the lake, while transportation is well exemplified by a series of eight lifts in the centre of the building running from the ground to the roof, which is used as a promenade. This series of lifts is marked externally by a turret springing from the ridge. The façade consists of a continuous arcade, with wide piers, enclosing a subordinate colonnade and entablature under each arch, the façade being crowned with a deeply projecting cornice 53 ft. from the ground, which serves to protect the colour from the weather. In the centre of the east façade is the great semi-circular archway, with

receding planes elaborately carved, and which is known as the Golden Gateway; it is 100 ft. wide and 70 ft. high, and has a square projecting cornice raised above that to the aisle. On each side of the entrance, in the space caused by the projection of the porch, are placed octagonal kiosks with a projecting balcony under, and covered with a circular roof; these balconies are approached by external staircases, and are elaborately treated with sculptured decoration. It was originally intended to cover the whole of the central gateway with gold leaf, but from motives of economy it was treated with aluminium, and covered with a yellow lacquer, the effect of which is very fine, as, by the action of the weather, the tone varies. The parts below the surface are picked out in subdued blues and reds to accentuate the form.

The important colour scheme introduced into this building will be treated in a separate article.

The Horticultural Building, by Messrs. Jennie & Mundie, of Chicago, is situated immediately to the north of the Transportation Building, with its main frontage of 1,000 ft. facing the wooded lagoon. The plan consists of a central dome constructed with lattice ribs of light steel springing from the ground, the dome itself being 180 ft. in diameter and 115 in height, and is placed in the centre of a square pavilion. The dome is almost semi-circular in form, being struck from the level of the first story, 25 ft. from the ground, and therefore only 25 ft. more than its radius, and 65 ft. less than its diameter, which is a novel proportion for a structure of this kind. It is supported on either side with smaller domes towards the front, and, as it were, filling up the angles of the square base from which the dome springs. The main entrance, placed on the axis of the dome, consists of a projecting porch with semi-circular arched opening supported on Ionic columns and with sculpture group, on either side. At the extreme ends of the façade on either side are two storied pavilions 118 ft. on face and 250 ft. deep. These are connected with the central structure by two low one-story galleries 90 ft. apart, thus forming an open court of this width between them for the display of flower gardening, &c. The rear gallery is continuous between the main wings, but the front one stops on either side against the square mass supporting the central dome.

The roof to the front galleries is circular in form, that to the rear being a double-pitch one. It was natural that a building devoted to horticulture should take the form of a gigantic greenhouse, and the architects seem to have realised this, and further, to have succeeded in giving the building something of a monumental appearance. The central dome, which is of real utility, and even necessary for the proper display of huge palms, tree-ferns, bamboos, &c., and which is supported on either side by the two smaller domes, is a very well conceived feature, and being so low in proportion to its height seems to grow, as it were, out of the ground, and to be therefore quite in keeping with the object for which the building is designed.

As to the general scheme of the exterior, it seems to be founded, in its main essentials, more or less on the Library of St. Mark at Venice. The curtain walls consist of a series of Ionic pilasters, around which the cornice breaks 22 ft. 6 in. from the ground, the alternate pilasters being carried up and crowned with flag-poles. Between the pilasters are semi-circular arches allowing the largest possible amount of glass. The two wings are, as has been mentioned, in two stories. On the ground story the Ionic order to the curtain wall is carried round, while the upper story is also treated with the Ionic order, over which is placed an entablature with a frieze 6 ft. in depth, and therefore out of proportion to the height of the columns. This frieze is very richly modelled with figure subjects, garlands, and festoons. It was, however, deepened in this way so as to give height to this portion of the building, and to enable it to compete with the neighbouring structures in this respect; but the exaggerated height of the frieze is hardly satisfactory, and it has not the great quality of utility which induced Sansovino to exaggerate his frieze at the St. Mark's Library. Mr. Lorado Taft, of Chicago, is responsible for the decorative modelling and sculpture on the building, some of which is unquestionably very fine. The two groups on either side of the front entrance, placed on a high pedestal, and representing the "Awakening" and the "Sleep" of Flowers, in which the principal figures are 8 ft. high, are treated with poetic feeling and thoroughness of *technique*, which make them worthy of more than a temporary existence. The whole structure could not be taken for anything else but a gigantic green-house, but it is a green-house in which a certain amount of graceful and monumental effect has been gained, which certainly makes it a success.

To the north of the Manufactures Building stands the United States Government Building, probably the worst in design and general treatment on the ground. It is, however, interesting in showing us to what depths official architecture has sunk in the States. But good may come of it, seeing that it has apparently sounded the death-knell of the system, as a Bill is now before Congress which will cause all public buildings to be thrown open to competition. The building is rectangular in plan, and measures 350 ft. by 420 ft. In the centre is placed a dome 120 ft. in diameter and 150 ft. in height, constructed of steel and supported on sixteen columns. The space below the dome gives access to all the principal galleries, whose main axes run north and south. The main entrances are on the long façades, while square pavilions with pyramidal shaped roofs occur at each angle. The exterior is in a very coarse type of Renaissance, which is hardly worth criticising, so poor and meaningless is it in design and commonplace in general conception.

The dome rises in the centre, and though not absolutely bad in general proportion, the detail is singularly so, and the black colouring of the panels between the ribs does not help it. Probably the worst part is the "ornamentation" to the interior of the dome, in which sprawling cupids, flowers, fruits, and national trophies are mixed together without any regard to colour, treatment, or suitability, and making it altogether one of the most vulgar attempts at decoration it is possible to imagine.

The Fisheries Building, reached by a small bridge over the canal to the north, is by Mr. Henry Ives Cobb, of Chicago, and consists of a large central structure with two smaller polygonal buildings covered with pyramidal roofs and connected with it on either side by arcades. The extreme length is 1,100 ft. by 200 ft.

In the centre of the main building is a rotunda 60 ft. in diameter. The exterior is interesting, in that Mr. Cobb has exerted his ingenuity in arranging innumerable forms of capitals, brackets, &c., in which, while the general form has been kept on Romanesque lines, fishes and sea forms generally have been worked into the designs. "Staff" lends itself very favourably to this intricate form of modelling. The roofs are covered with red Spanish tiling, which contrasts not unfavourably with the toned colouring on the walls.

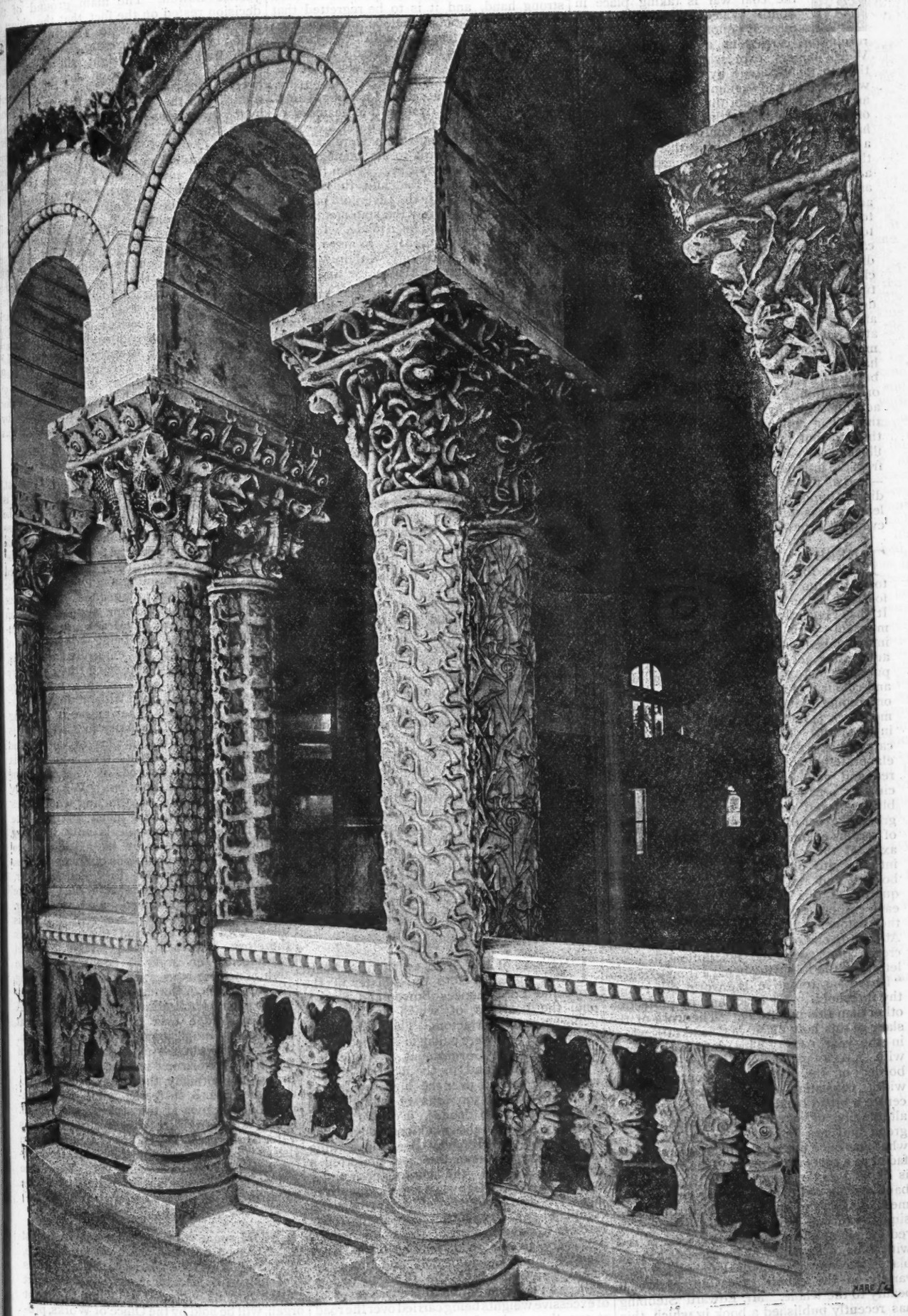
The Art Building, situated still further north and fronting on to the smaller lagoon, is a very chaste piece of modern French work of the most refined and scholarly type. It is by Mr. C. B. Atwood, of Chicago, the designer in chief to the Exhibition. In plan, it consists of a central building 500 ft. by 300 ft., with a central gallery 70 ft. wide on the centre of each axis and in one height. At the point of intersection of these galleries rises a flat dome 60 ft. in diameter, springing from a low pediment on each face above the roof. At the end of each of the naves, where they abut on the façades, are grand entrance porticos of Ionic columns, and with sculptured friezes with figures and pediments, and approached by broad flights of steps. Along the façades on each side of the entrances are Ionic colonnades forming covered ways, behind which are the walls of the aitch galleries, the inner ones abutting on the central naves; these great naves are occupied with sculpture and statuary as in the last Paris Exhibition, and the inner picture galleries are entered from these naves and lighted from the top. On either side of the main building are one story annexes 200 ft. by 120 ft., which are connected with the main building by colonnaded galleries, and which project toward the north, thus forming a three-sided court towards the main front; these are treated somewhat similarly to the main building, with colonnaded entrances on two of the faces, and low central stepped dome.

The design, both as a whole and in detail, is one of the most satisfactory on the ground, but it is thoroughly French, and appears to be founded in its main features, especially the principal entrances, on a Prix de Rome design submitted by M. Bénard, in 1867. The well-known treatment of the frieze figures is here introduced, and many other distinctive similarities are noticeable. The upper parts of the walls behind the smaller colonnades to the wings have reproductions of the Parthenon frieze, harmonising well with the general Greek feeling pervading the design, and with the purpose of the building. Mr. Philip Martiny has executed the other sculpture work on the building, and his figures representing architecture, painting, and sculpture on the main frieze are very finely conceived. The building is fireproof throughout, necessitated, of course, by the costly contents. The *tout-ensemble*, as seen across the lake in front, is one of the most satisfactory of modern "classic" designs that we know of.

Immediately to the north of the Horticultural Building is the Women's Building, erected from the designs of a lady-architect, Miss Sophia Hayden, of Boston, and a graduate of the Massachusetts Institute of Technology at that place. It is Renaissance in design. In plan, the main feature is the great hall, 250 ft. long and 67 ft. wide, in one height with elliptical roof and lantern light. This central hall is surrounded by a two-story structure, consisting of committee-rooms, lecture rooms, &c. Staircases are placed at each angle of the building. On the inner part of the flat roof is placed the restaurant, while the outer portion is used as a roof garden.

The elevation consists of a ground story of Ionic pilasters formed into columns, where the colonnade occurs, and an upper story of Corinthian pilasters and entablature, above which is a screen of small columns, standing above the parapet, and with caryatids interspersed, thus forming a screen for the training of creepers, as in some of the Genoese palaces. We have previously stated our opinion about this building. It appears to have been studied in an atelier, and to be a school problem. The plan is very badly laid out. The rooms surrounding the hall are dark, and the general scheme seems imperfectly studied, in marked contrast to the other buildings, while the exterior seems a meaningless array of columns and pilasters, with very little reference to proportion or composition.

Cambridge Antiquarian Society.—The Antiquarian Society of Cambridge visited Colchester recently, and spent the day in inspecting the various objects of archæological interest in the town. Mr. Henry Laver acted as conductor of the party, which numbered about thirty. On reaching Colchester in the morning the visitors were driven to the Castle, and after inspecting that building and its contents, they went on to visit the Balkan Gate and the old wall on Balkerne Hill. Through the kindness of Mr. Geo. Joslin, the party then had the opportunity of viewing the "Joslin Museum," and they afterwards visited in order St. John's Abbey, St. Giles' Church (to see the Lucas and Lisle monumental slab), and St. Botolph Priory, and after partaking of tea at the Cups Hotel they returned to Cambridge.



Detail of Fisheries Building, Chicago Exhibition.

NOTES.

AN extraordinary development of the coal war is taking place in South Wales this week. We recently quoted the terms of a resolution carried at a large meeting of Welsh miners, expressing their determination to loyally abide by the sliding scale of wages which had been mutually agreed upon; and there is no doubt that a large proportion of the men are still in the same mind. They have, however, been completely outvoted at a most excitable gathering this week, when the sliding scale was denounced as having a most demoralising effect upon the men, and a demand made for an immediate advance of 20 per cent. It was decided to stop work at once, and to employ force towards all dissentients. This is, of course, causing numerous collisions; and the district in question, so far from remaining clear of the struggle, is in a far more disturbed state than those in which it was deliberately undertaken. The miners who are willing to work are intimidated and attacked in a most barefaced and cowardly manner, the prime movers in this being the hauliers. It is altogether a most deplorable business, as there is an entire lack of effective organisation among the men, and it is acknowledged by those most friendly to them that their action is indefensible. Indeed, there is but little doubt that it is entirely illegal as well as reprehensible—even apart from the intimidation which is being practised—and as the strike has been entered upon in direct opposition to the counsels of the leaders, it is difficult to imagine what course events will now take.

THERE is now in the upper gallery of the Indian section at South Kensington Museum the magnificent Holy Carpet, formerly in the Mosque of Ardebil, in Persia. It has recently been acquired for the museum with the assistance of private individuals, the sum at the disposal of the authorities not having been sufficient for the purchase. Apart from its beautiful design and colour it is more than ordinarily valuable on account of its being a dated example. It measures 34 ft. 6 in. in length, and 17 ft. 6 in. in breadth. The central portion of the carpet has a dark blue groundwork, with an elaborate network of floral devices, chiefly in red and yellow. In the centre is a large circular ornament or medallion with light blue and red pattern on a cream-coloured ground. From this radiate sixteen cartouches of various colours, those in line with the main axes of the carpet being green, while the intermediate ones are yellow, with a red border, and red with a yellow border. A quarter of this central device is repeated in each corner of the carpet, while from two of the cartouches are representations of lamps. At the top end of the carpet is a panel of light cream colour, with the inscription in black lettering, the following being a translation:—"I have no refuge in the world other than thy threshold. My head has no protection other than this porchway. The work of the slave of this holy place, Maksoud of Kashan, in the year 942." This date corresponds with A.D. 1535 of our reckoning. The border of the carpet is about 3 ft. in width, consisting of three parts; in the centre a broad band with octofoil cartouches, alternately of circular and oblong form, green and red in colour respectively, on what was once probably a black ground, now faded to a greenish brown. This broad band is flanked on the outer side with a narrower band of light red or brown with green ornament, and on the inner side with a band of similar width of light yellow or cream, with red ornament and a still smaller band of red with blue ornament. The carpet has in places become a good deal faded, but this variety in the colour gives an additional beauty to the whole. Mr. Edward Stebbing has recently published a book in which this carpet is fully described and illustrated, with coloured plates drawn to scale.

TO libel a rival in trade, in other words, to issue false statements about his business, is a thing to be put down with a strong hand, and it is to be regretted that in these days unscrupulous persons may make such statements with comparative impunity until the libelled person seeks the protection of the law. Last week, at the Liverpool Assizes, Milner's Safe Company, Limited, brought an action for libel against a Mr. Radcliffe, a rival in the business of safe manufacturers, for an issue of a circular in which various imputations were made on this company in regard to its management, manufactures, and solvency. When the case came into court, Mr. Radcliffe, through his counsel (as reported in the Liverpool papers), "unreservedly withdrew the statements, and regretted that they had been made." In other words, this person appears to have made false statements and only withdrew them when face to face with a judge and jury. Such a manner of competing in trade is a disgrace to English business men; a limited company of long standing and high position can withstand such attacks better than a single individual, and, probably, these particular attacks will recoil on the person who made them. But the fact that such attacks are made shows how a desire of gain takes away the moral sense even in respectable persons. The trade libeller is not a whit better than the burglar or the pickpocket: each seeks to obtain money by unlawful means.

TWO other assize cases which have just been heard also deserve to be noted. At Bristol a tenant recovered substantial damages from a landlord as compensation for loss of health through defective drains. It was admitted that the landlord was bound to keep the drains in a proper state of repair, and that sewer gas got into the house. But it was contended that the gas came from the main sewer, and not from the house drains, but the jury found against the landlord. But it is surprising that it should have required an expensive litigation to arrive at a result which a competent surveyor should have been able to state to the parties. In the other case an architect has obtained damages from the Midland Railway Company for injuries sustained through the defective lighting of this company's station at Swansea. We are glad to find that the plaintiff was successful: railway companies light many of their stations very imperfectly. We do not say that they should use the electric light, but the lamps might be better constructed, have reflectors to throw the light down, and be more powerful. That more persons are not injured at railway stations is the result of their caution, and not of any good lighting by the companies.

THE case of Hill & Co. *v.* Thomas, heard on appeal before the Master of the Rolls and Lord Justices Bowen and Kay, is one, the bearings of which are of some importance to contractors. The plaintiffs are contractors who were engaged in constructing a battery for the Government at Angle Bay, Pembrokeshire, and in the course of this work they carried over the highway known as Angle-road, 8,500 tons of shingle and cement, in 9,000 loads; a traffic which naturally cut up the road seriously. The Surveyor of the Highway Board, according to the *Times* report of the case, preferred a complaint against the contractors under section 23 of the Highways and Locomotives Act, 1878, and the justices before whom the complaint was brought ordered the contractors to pay the cost of the extra repairs necessary to the road, amounting to 105*l.* Messrs. Hill & Co. appealed, and the Divisional Court reversed the decision of the justices on the ground that there was no proof of excessive weights being carried over the road at one time, only of an unusual amount of traffic. The Surveyor by leave appealed, and the Court of Appeal confirmed the original decision of the justices on grounds stated in a long judgment delivered by Lord Justice Bowen. The main ground of the decision rested on the fact that the object of the section was not to prohibit excessive traffic but to place the extra cost incurred by such traffic on the right shoulders; and secondly, that the section distinguishes between "excessive weight" and "extraordinary traffic," and that therefore the damage done by "extraordinary traffic" may be considered apart from that due to excessive weight. And the Court of Appeal held that "extraordinary traffic" must be defined in relation to the usual and ordinary traffic on the road. It being admitted that the amount of use of the road by the plaintiffs was greatly in excess of the usual traffic, and the wear and tear of the road and the consequent extra expenses of maintenance were entirely due to this extra amount of traffic carried over it by the plaintiffs, the case came under the definition of "extraordinary traffic" as contemplated by the section, and the original decision of the justices was accordingly confirmed. It is therefore obvious that contractors who have to carry the materials for a large contract over a country mostly used only for a comparatively limited amount of traffic must expect to be rendered liable for any extra repairs rendered necessary by their traffic, and will do well to take this into account as a contingent expense.

THE combination of metal and cement, or concrete, for structural purposes is finding wider application day by day. The full-size model of the Eddystone Lighthouse at the Naval Exhibition was a notable example in this country. There, it will be remembered, a "skin" composed of expanded metal sheeting, forming, as it were, a metallic trellis-work, was embedded in cement concrete, the whole being supported by an iron skeleton. In America some quite important buildings are being constructed of concrete, in which are embedded iron rods, for the purpose of supplying the necessary tensile strength, and in this way large floor spans are obtained without undue thickness of material. The museum building of the Stanford University in California is one of the latest examples of monolithic construction, in which the concrete is strengthened by iron rods on what is known as the Ransome system. We recently described a plan of constructing water-pipes and reservoirs, framed much on the same lines; and the principle is now receiving further development by its application to such important structures as highway bridges. The "Monier" system, to which we refer, consists essentially of two arches of wire netting, one superposed upon the other. The space between these two spans is filled with concrete, and the metal work therefore represents the intrados and extrados of an arch. Frequently but one arch of netting is used, naturally that forming the intrados. A foreign contemporary illustrates some applications of the system. A highway bridge over the Nador Canal, at Sarbogard, Hungary, has an arch of 50 ft. span, the rise being about 7 ft., and the thickness of the crown is close on 8 in. In another highway bridge, in Germany, the span is 65 ft. 6 in., and the rise 8 ft. 3 in., while the thickness of the crown at the arch is just on 8 in. A still more striking bridge in appearance is a foot-bridge, of 115 ft. span, and having a rise of 13 ft., the uniform thickness throughout being just under four inches. The same system is being applied in Hamburg to the construction of sewers.

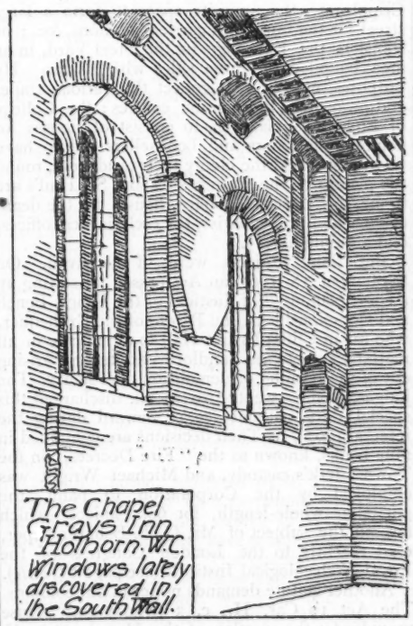
FROM some correspondence that has just passed between Mr. G. Shaw Lefevre, M.P., and Mr. Hood Barrs, L.C.C., it seems that in the course of next week the Albert Palace and its contents, including the great organ, will be sold by the Office of Works, proceeding under their distress for arrears of rent, which in October last amounted to 2,250*l.* The Board then agreed to postpone further

measures for vacating the lease, and to accept a conditional offer of 20,000*l.* for their interest in the land and remaining property; but, so far, no agreement has been arrived at between the Acquisition Committee and those who are interested in the Board's lease. The Palace and grounds, covering over ten acres, and on which it is said more than 100,000*l.* has been expended, was opened in June, 1885, having been erected after the designs of Messrs. F. & H. Francis. At the projected sale by auction on April 27 of last year, with an upset price of 5,000*l.*, no bid was made. The organ, which has formed a nesting-place for sparrows of late, was built by Messrs. Bryceson Bros., under the directions of Mr. T. W. Best, and was sold to the Palace some years ago by Mr. Holmes, of Regent's Park. It is a noble instrument, having its stops and four key-boards separated from the main body, and so placed that the organist faces the area of the concert hall. In a letter addressed to a daily contemporary, Mr. Hood Barrs writes that the County Council make the acquisition of the organ a *sine quâ non* of their taking over the Palace as a place of public resort, that the Battersea Vestry has promised 5,000*l.*, and Mr. Passmore Edwards offers, he believes, 15,000*l.* towards a sum of 26,000*l.* for purchasing the Palace, organ, and fittings, and putting them into good repair. We understand that in the building were used the stone materials of the King's Bench Record Office (behind which Soane built the old Law Courts, Westminster Hall), originally erected by Kent (some say that Ripley helped him) for the Commons Committee Rooms, and pulled down in 1883.

WHAT is the duty of a landlord of a building, which is let in flats or as offices, in regard to keeping the staircases in repair? The answer is to be found in a case recently decided by the Court of Appeal, Miller *v.* Handcock. The plaintiff, who had to visit a tenant of one of the large blocks of buildings so common in the City, fell down the stairs and was seriously injured, owing to the defective condition of a staircase, and he accordingly sued the landlord for damages, which it was held he was entitled to recover. "It seems to me," said Lord Esher, "that there is an implied obligation on the part of the landlord to the tenants to afford a reasonably safe entrance and exit, or else he is letting to the tenants that which will be of no value to them. What is the use of a second floor to any one if the staircase, by which alone there can be access to it, is to be allowed to go to ruin?" Obviously it would be contrary to common sense to say that a landlord is not bound to keep the stairs in proper repair. We are only surprised that it should have been necessary to go to the Court of Appeal for an answer.

THE *Quarterly Journal of the Geological Society*, just issued, contains a suggestive paper by Mr. Frank Rutley, F.G.S., "On the Dwindling and Disappearance of Limestones," a subject having direct bearing on the causes of variation in quality and structure of many freestones, although the author does not deal with it in that connexion. He remarks that there are probably few instances in nature in which limestone-beds are so protected that water cannot gain access to them. A limestone-bed to which water charged with carbonic acid gains access becomes gradually dissolved, and, furthermore, the solvent action of humus acids must also, in some cases, be taken into account. The question whether such a bed will completely vanish is one which involves merely the magnitude of the bed, the duration and energy of the solvent action, and the freedom of the limestone from foreign matter of a more or less insoluble nature. If unlimited time be conceded, there seems, he says, no reason why very thick beds of limestone should not wholly disappear—at all events, thin ones may easily do so. There is a great deal of truth embodied in these observations, but we are unable to accept all the author's conclusions. It is perfectly right to say that limestones are wasted away underground by the action of solvent water, and we have abundant evidence in stone quarries, where the workable beds of stone alternate with more or less worthless materials, that the solvent action has caused a considerable amount of dwindling in the latter, which obviously were much thicker than they are at present. We know also in regard to the Chalk formation that it was much thicker than it now is, having been reduced to its present condition by the action of percolating water. But when we read that the process is to be applied to all limestones, and that it is only a matter of time—geological time, of course—for all such stones to disappear, we feel compelled to dissent. It goes without saying that carbonate of lime is readily decomposed by carbonic and other acids found abundantly in water, but under certain structural conditions limestone is hardly affected thereby. Indeed, the solvent action is in part reconstructive, for we know in regard to many of our most durable building freestones, that the semi-crystalline condition in which they are now found, is almost entirely due to the chemical changes wrought in them by the agency of percolating water. We are unable to follow the author in regarding the action referred to as producing very widespread effects. It undoubtedly has caused the disappearance of certain thin limestones, but, on the other hand, it has led to the more complete preservation of other kinds.

DURING the alteration and restoration, which is being carried out at the Chapel of Gray's Inn, some windows have been found in the south wall, and traces of similar ones on the north side. They are of three lights with four-centred enclosing arches deeply recessed from the inner face of the wall. At the west end of the wall a relieving



arch is shown formerly of a doorway, which stood nearly opposite to the present north-west entrance to the chapel. Over the windows are two oval ones of much later date corresponding with similar ones, also on the north side, and immediately underneath the late flat ceiling. There appears to have been a chapel founded here in 1315, in connexion with the family mansion of the De Grays, which stood here. The windows discovered belong to late Perpendicular times, when the chapel must have been entirely rebuilt, although we believe no record exists of it. In 1619, an order was made for the rebuilding of the chapel, but, doubtless, owing to want of funds, this was not done, and it was not until 1698 that any extensive alterations were made. The main walls seem to have been left, the oval windows inserted, and the fittings generally renewed.

THE choice of St. Dunstan's-in-the-West for the proposed memorial window to Izaak Walton, is guided by the fact that he resided for some years, and served as overseer, in that parish. Admitted of the Ironmongers' Company on November 12, 1618, he opened one of the little shops over Gresham's Bourse, Cornhill, whence he removed to Fleet-street, where, in a deed of 1624, he is described as "linen-draper," and as sharing a house with John Mason, hosier. The wood and plaster house, of *temp.* Edward VI., which until May, 1799, stood at the south-west corner of Chancery-lane, and, together with the "Three Squirrels" (Goslings' bank) opposite, was reproduced in Mr. G. H. Birch's "Old London" at the Health Exhibition of 1884, was commonly called Walton's. But Sir John Hawkins says his house stood two doors west of the lane, being next westwards of the "Harrow" Inn. In later years it was represented by No. 198, Fleet-street—Kenning's Masonic depôt—in the block between Bell-yard and Chancery-lane pulled down, together with Apollo-court and the "Cock" tavern, in 1881-2, for the Bank of England branch-office. In 1632 Walton moved to a house by the entrance into Crown-court, west side of Chancery-lane, and then into another house three or four doors north—where now stands the London Joint Stock Bank branch-office — and opposite to which Jacob Tonson afterwards opened his first shop by sign of the "Judge's Head." This is probably the house he mentions in his will, demising an interest for sixteen years therein to his daughter and her husband, Dr. Hawkins, of Winchester. Bell-yard and Fetter-lane were once renowned for their fishing-tackle shops. In 1640 Walton edited a volume of sermons, to which he added a life, of Dr. Donne, who was vicar of St. Dunstan's, 1624-31. But it is not generally known that he was living in Clerkenwell, near Cobham-row, when his most famous work was first "Printed by *T. Maxey* for RICH. MARRIOT, in *S. Dunstans* Church-yard, Fleetstreet, 1653." Sir N. Harris Nicolas says, in his edition of "The Compleat Angler," that Walton left Chancery-lane *circa* August, 1644; he went, it seems, to Clerkenwell, in 1649, staying there until the end of 1661, in November of which year his name occurs for the last time as assessed to the poor's rate. Finding London, he avers, not the place for an honest man to live in, he ultimately retired to Winchester. He was buried beneath a black marble slab in the floor of Prior Silkstede's chapel, of whose screen we published on July 15 last Mr. R. M. D. Lucas's measured elevation and plan. In the National Gallery is Jacob Huysman's portrait of Walton, in his old age.

VARIOUS schemes have lately been brought forward in Bath with reference to the proposed increase in the water supply to that city. The corporation is naturally jealous of any attempt at obtaining water from deep wells, especially in the vicinity of the Grand Pump Room, as it might lead to some infringement of its rights over the hot water springs; more than one well boring has had to be abandoned by reason of that. In this connexion we may notice a valuable contribution to the literature of Somerset wells and borings from the pens of the Rev. H. H. Winwood, F.G.S., and Messrs. W. Whitaker, F.R.S., and H. B. Woodward, F.G.S., which appears in the current *Proceedings of the Bath Natural History and Antiquarian Field Club.* The first-mentioned observer in recording a deep well-boring in Bath remarks that the surface springs and shallow wells upon

which the water supply formerly depended are now found insufficient, for many reasons. This boring is on the east side of Bathwick-street, in the yard of the Bath brewery, and penetrates to the blue Lias clay. Particulars of other wells are given from near Spurway's reservoir, on the southern slope of Lansdown, also at Bedminster, Curry Rivell, Harptree, Langport, Shepton Mallet, South Widcombe, Taunton, and Wrington. We note that whilst the sub-divisions of the beds passed through in sinking each well are carefully set out, the description is not always accompanied by an account of the quality and quantity of water met with. It is not sufficient to say that "water was found on breaking through this latter bed," "water was just oozing up," "supply is abundant," &c. In every case accurate details should be given as to the yield, and it should not be difficult to state the quality of the water in general terms. On looking through literature relating to wells we have noticed that these desiderata are frequently not given.

THE MONUMENT.

Considerable alarm was felt when, on the morning of September 25, 1888, a fragment of masonry fell down from the top of the Monument. The civic authorities put up a swinging scaffolding, the entire fabric was examined, and the late City Architect took the opportunity to make measured drawings, comprising vertical and horizontal sections, on a scale of 8 ft. to one inch. Some repairs were executed, and the ornamentation of the abacus, originally fastened by iron bolts, removed. In his interesting book* Mr. Welch assures us that the result of the examination showed the remarkable strength and soundness of the column, "the stone being of splendid quality," he says; and adds: "The building is now in as good a condition as ever." We commented upon the material—Portland stone—employed, in an article in our paper of October 6, 1888, questioning the desirability of using even the best stone now quarried in the island, for public buildings in our capital. The Monument stands, and is likely to stand for many a day, a notable memorial of a great disaster, still to furnish, as it did to Dr. Johnson on the ill success of his tragedy, a simile for resolute stability.

This small volume appears opportunely when we have the recent fire at St. Mary Axe in mind. Occupying the site of St. Margaret's Church, and distant by its own height of 202 ft. from the shop of the King's baker in Pudding-lane, where the flames broke out, it overtops all similar structures as well as the spirelet that surmounts the graceful cupola and lantern of the neighbouring church of St. Magnus the Martyr. The views to be obtained from its summit are superior in some respects to those gained by ascending St. Paul's. Mr. Welch's official position as Librarian to the Corporation, combined with his well-known attainments in archæology and historical literature, enables him to produce what should form a standard work upon its subject. Whilst compelled, by nature of the case, to rehearse many particulars already familiar, he puts all the material into an attractive form, and has been at the pains to collect a valuable stock of information upon views, bibliography, and authorities (printed and in MS.) in respect of the Monument and the Great Fire. He gives a brief account of the Fire itself, and does justice to what we are now rather prone to forget—the activity and sympathy displayed by Charles II. and his brother. And here we may mention, since we do not find it noticed, that in the last scene of his "Marriage à la Mode" Hogarth illustrates the old rule of keeping water-buckets in the aldermen's private houses. An Act of Common Council, 1667, ordained that the aldermen should equip their houses with one hand-squirt and twelve or twenty-four leather buckets apiece; and that every parish should keep in readiness two brass hand-squirts, in addition to the 800 buckets, fifty ladders, with other tools, to be provided by each of the four divisions into which they divided the City for this purpose. To supply the squirts and the City Companies' engines with water, pumps were to be placed in all wells, with fire-plugs in the mains of the New River and Thames Water Works.

Besides those formulated by Evelyn and Wren, several plans were advanced for a rebuilding of the City. In his diary, Evelyn writes:—

September 13.—I presented his Majesty with a survey of the ruines, and a plott for a new Citty, with a discourse on it; whereupon after dinner his Majesty sent for me into the Queen's bed-chamber. Her Majesty and the Duke [of York] onely being present; they examin'd each particular, and discours'd on them for neere an hour, seeming to be extreamely pleas'd with what I had so early thought on.

In a letter to Sir Samuel Tuke, dated at Sayes Court, September 27, Evelyn says:—

The King and Parliament . . . . . are now busied with adjusting the claimes of each proprietor, that so they may dispose things for ye building after the noblest model. Every body brings in his idea, amongst the rest I presented his Majesty my owne conceptions, with a discourse annex'd. It was the second that was seene within two [sic] days after the conflagration, but Dr. Wren had got the start of me.

Inasmuch as Wren's and Evelyn's are the best known, by name at any rate, it may not be amiss to briefly indicate the salient features of their respective schemes, premising it was due to the jealousies and apprehensions of the citizens that so signal an occasion was lost; and now—as we pointed out in reviewing Mr. Arthur Cawston's book (see pp. 23-5, *ante*)—the evil seems to be past remedy.

Wren, of whose plan Mr. Welch gives a copy, designed parallel streets crossing at right-angles; the three principal, with two or three cross, streets, to be at least 90 ft. wide, others 60 ft., and the lanes about 30 ft. Around the Exchange he disposes the Post, Excise, Bank, Mint, and Insurance Offices; he places piazzas at the end of London Bridge, and two others to stand square with this and the Exchange, with another about half-way up Fleet-street. The halls of the twelve chief Companies he ranges in a square about Guildhall; a quay from the Temple to the Tower is inscribed, between Bridewell Dock and Queenhithe, "the Grand Terras with the Publick Halls." The churches he fixes in conspicuous positions, and, for the most part, at street corners, but all churchyards, gardens, and unnecessary vacuities, all trades using great fires or producing noisome smells were to be placed without the City. Evelyn lays out new burial grounds along the wall between Aldgate and Cripplegate, the opposite space to form a large street for the inns, with carriers' stations, &c.; he transfers the Exchange to the Steel Yard, in an area bounded on three sides with piazzas. He proposes, moreover, to collect the various trades and professions in common centres: the College of Physicians' piazza is to consist of houses for doctors; stationers and booksellers are to have their shops, and the clergy their residences, round the piazzas of the churches; about St. Paul's are to be the episcopal palace, houses for the dean, canons, and prebendaries, the ecclesiastical offices, and a public library.

But these projects were of no avail. On September 18, 1667, an Act passed for setting up a court composed of Justices of the King's Bench and Common Pleas, and Barons of the Exchequer, who sat in Clifford's-Inn Hall to adjudicate in all matters, as between landlord and tenant, arising out of the burning or demolition of property. The judges, being twenty-two in all, discharged this special duty without fee or reward during the interval 1667-73. Their decisions are contained in nine books, known as the "Fire Decrees," in the Town Clerk's custody, and Michael Wright was employed by the Corporation to paint the portraits—whole-length, for 60*l.* apiece—which formed the subject of Mr. G. B. Scharf's paper, read recently to the London Congress of the Royal Archæological Institute (see page 65, *ante*).

Another statute demands notice in our columns. The Act 19 Car. II., c. 3 (whose 29th clause provides for the erection of the Monument itself, by a duty of 1*s.* a ton upon all coals brought into the Port of London) makes certain rules to govern all persons concerned in the rebuilding. These prescribe that there shall be only four sorts of buildings; the first, or smallest kind, in by-lanes, to be two floors high (9 ft.) besides cellars and garrets; the second, in noted streets and lanes, of three floors (10 to 9 ft.) with cellars and garrets; the third, in principal streets, of four floors (10 to 8 ft.) with balconies, besides cellars and garrets; and the fourth, for houses of leading citizens and people of quality, at the builder's discretion, to a limit of four floors. All cellars to be 6 ft. 6 in. high, the height of the garrets at the builder's discretion. All new buildings to be constructed of stone or brick; with party walls ranging from two to one brick, and front and back walls from two-and-a-half to one brick; and to be thus erected within three years after the fire upon pain of the then vacant sites being disposed of by the Corporation.

The Act provides for the widening of certain streets, with all narrow passages less than 14 ft. wide, and for the making of new thoroughfares, including King-street, Cheapside, and Princes-street. It also ordains that the Lord Mayor should draw up tables to regulate the prices of materials and the labourers' wages; and that for the greater expedition of the work all labourers, being non-freemen, should for seven years, or longer, have the same liberty as that enjoyed by freemen, freedom for life being conferred on all who should labour for a period of seven years. This franchise is supposed to be commemorated by the figure of Liberty in Cibber's relief upon the west front. In that same year the Court of Common Council issued "rules and directions for the pitching and levelling the streets and lanes of the City," under which the slopes of many thoroughfares were altered, some being raised by as much as 7 ft. or 8 ft. We will add that the house in Monument-yard where Goldsmith lodged, 1757-8, as assistant to Jacob, the apothecary, was pulled down about ten years ago for the new approach into Lower Thames-street, designed by Colonel Haywood, engineer to the City Commission of Sewers.

THE ARCHITECTURAL ASSOCIATION:

TWENTY-FOURTH ANNUAL EXCURSION.

The head-quarters of the excursion having been fixed for this year at the quiet and small town of Diss, the members gathered in their usual fashion during the Saturday and Sunday preceding the official commencement of the week's work. Diss, although a small town, is a very pleasant centre for architectural excursioning, and enables the party to gather up some of the fragments left from the Norwich, Lynn, and Bury St. Edmunds excursions. Indeed, the counties of Norfolk and Suffolk are so full of architectural interest that many tit-bits are still left unexplored, and Sunday was partly occupied by the members who had arrived in discussing the merits of places near their routes which they would like to visit, as well as in walks to spots within a short distance of the head-quarters, such as Palgrave, with a good timber roof and picturesque situation, and Frenze, possessing as its chief merit its freedom from restoration, and hence sundry scraps of seventeenth-century woodwork, as well as some ten brasses mostly of the sixteenth-century date, and to the memory of members of the Bleverhassett family.

Monday.

The first building visited was the church of St. Andrew, South Lopham, chiefly remarkable for its very fine central Norman tower, which divides the nave, with its north and south aisles, from the chancel. The north door, now blocked up, also is a relic of the Norman church, but the main structure appears to have been erected in the Decorated period, considerable additions and modifications, including the clearstory, having been added by Perpendicular builders. Like most of the churches of the district, this shows some good examples of flint and stone panelling, and the effect of the clearstory carried out in this manner, and supplemented by occasional red bricks as borders to the arches, is very pleasing. The letters S, T, and A are worked into the panels, between windows of clearstory, as well as the constantly-recurring M.R. conjoined. An interesting point is the existence in the south wall of the chancel of a so-called leper's window, which is both larger and at a higher level than these are generally found. The form of the piscina is somewhat unusual, it having a half-arch open towards the sedilia, with plain triple-stepped stone benches without canopies. A piscina also exists in the vestry, and apparently is in its original position, though possibly it orginally existed for the service of a side chapel rather than of a sacristy. Of the old woodwork of the church there remain some bench ends, now re-used for the new choir seats, introduced when the chancel was restored in 1866. The original Perpendicular roofs of the nave and aisles also remain, though not elaborate in design, and there are indications, in the mortice holes for the main sill, of a chancel screen having formerly existed, though all other trace of it has vanished. The nave and aisles of the church were restored and reseated in 1874.

From South Lopham the party proceeded through North Lopham, in which parish, by the way, both the Waveney and Little Ouse take their rise about three yards from each other, and

* "History of the Monument." By Charles Welch, F.S.A. Published under the authority of the City Lands Committee of the Corporation of the City of London: 1893.

diverging, pursue their opposite courses. Then along the charming avenue of Quidenham-lane to Quidenham itself, whose church, dedicated to St. Andrew, looks very picturesque with its western steeple, made up of a circular tower with octagonal belfry stage and shingled spire. The greater part of the church is of Early English date, with a Norman south porch and north door. The latter has some interesting old ironwork of the strapping and tracing period of English smithery, but the woodwork of the door has evidently been renewed. In the vestry wall are three pillars, which are supposed to be Saxon, and probably part of an early font. The church contains several memorials and monuments to the Earls of Albemarle and other members of the Keppel family.

From the church the party proceeded to the hall, where they were received by Lord Bury, who showed them over the house, which from some few remains and a wooden model which is preserved, was originally a house of the Stuart period, to which has been added and incorporated a Palladian residence. To the artistic mind the chief attraction of the house is not the architecture, but the pictures, particularly the pastels, and the charming old gardens.

To see an example of the type of house that Quidenham originally was, the members proceeded to Wilby Hall, the first of the series of moated halls to be seen on the excursion. The house externally is a fine subject for the painter, and interesting to the architect from its imitation of the usual detail of Early English Renaissance stone buildings, executed in red brick and covered with stucco. The mullions, transomes, heads and sills of windows, as the whole of the rest of the house, are of brick, following the treatment that would have been adopted at the same period in stone. The gables are all crow-stepped, as is common in this part of the country, and to a first view rather suggest Flemish influence. It is, however, no more than the logical treatment of brick coping when stone tradition is absent, and hence common to the two stone-less and brick-full districts. Some doubt has been suggested as to the position of the entrance to the house, from indications of a bridge over the moat, towards what is now the back elevation, but there does not appear from the evidence of the building itself to be any question that the entrance of the present house was always in the present position. The hall was built by Robert Wilton, who was born in 1599, and died November 19, 1657. The arms of two of his wives are indicated on the frieze of the front entrance; those of the third have vanished. Robert Wilton is described as a colonel, but whether a Cavalier or a Roundhead does not appear. The description of the gallant colonel as a "faithful patriot and true lover of his country" was true of many on both sides. He was probably, however, a Parliamentarian, as that was the prevailing sentiment of this part of the country.

The church at Wilby, dedicated to All Saints, has some fine Decorated tracery in the windows, and, like most of its neighbours, a good tower. It is unrestored, and hence refreshing, with its scraps of woodwork of various dates, a pulpit of the seventeenth century, with the usual tester head, altar, rail and table, benches, and so on. The piscina in chancel is noticeable for the excellent carving of the sink, and evidently belongs to the Early English period of the church. The font has some interesting detail of Decorated date.

From Wilby the party returned by way of New Buckenham, which, though of considerably less size than it once was, has an air of importance that its present fortunes do not maintain.

It might be suggested that the distinctive prefix has lost somewhat of its suitability, as New Buckenham received its name when founded by William d'Albini, Earl of Chichester, in the reign of Henry II. The reason of the foundation is said to be that d'Albini disliked the situation of the castle, built about the time of the Conquest, at Old Buckenham, and so pulled it down and built another at New Buckenham, which is said to have consisted of a keep, two round towers, a grand entrance tower, and a barbican, and to have been enclosed with surrounding walls and fosse. The owner, who had view of frankpledge and the power of life and death, obtained from Henry II. many privileges for his new burgh, among which were those of holding a mercate court, the assize of bread and ale, and a market. The inhabitants had the privilege of exposing goods for sale at any market or fair in the kingdom, free of toll or stallage, while the lords of the manor claimed the right of officiating as butler at the coronation of the Kings of England. To compensate old Buckenham, as it were, for the loss of his own presence, d'Albini founded at that place of ancient importance a priory of Augustine canons, in honour of St. James the Apostle, using partly the materials of the old castle for building the new church and monastery. At the dissolution, the establishment consisted of a prior and eight canons, whose revenue was estimated at 131*l.* 11s.

The Church of St. Martin, at New Buckenham, is wholly of Late Perpendicular work, and a very fine example of the period, consisting of chancel, clearstoried nave of five bays, north and south aisles, south porch, and western tower. The interior was restored and reseated at the expense of the late John Gall, Esq., J.P., in 1879, but the exterior seemed to have more attraction for the visitors. This is hardly to be wondered at, as the tower and the south porch were, either of them, amply sufficient to fill the time at disposal. Both general design and detail were excellently worthy of study, the flint and stone panelling being more than usually rich and admirable in design. It is curious to note that we have here an example of the disfavour with which the north side of a church was regarded by our forefathers in that while the remaining sides, east, south, and west, are richly panelled, the north is left bare and cold.

There is a good tomb on the north side of the chancel. The font is of a type frequent in Norfolk, with lions (or leopards) sejant on the faces of the drum. The rood-screen has entirely vanished, and only the stair remains on the north side of chancel as evidence of its existence. From the date and size of the church it must have been a very fine example.

In the market place is a picturesque market cross or hall of small size, with the old pillory still remaining. Some very fine carvings of Perpendicular date are clearly fragments of an older building.

With New Buckenham ended the first day's work, though in a county so plentifully bestrewn with churches as Norfolk, those visited were by no means the only ones seen.

Tuesday.

Still confining themselves to Norfolk, the excursionists started this day from Diss in an easterly direction to Scole, or Osmondiston, where the chief attraction is the old inn built in the seventeenth century by John Peck, a merchant of Norwich, in 1655, at a cost of 1,500*l.*, and a notable stopping place on the great high road from Ipswich to Norwich. The house, as shown by old drawings, is now somewhat shorn of its most prominent feature, the great sign which spanned the road as a sort of triumphal arch, and had upon it a vivid representation of the story of Actæon. This was erected by one Fairchild at a cost of 1,057*l.* Besides this remarkable structure the house also had a portico and a rich timber porch, both of which have also vanished. Divested as it is of these salient features, the building is still a remarkable one, with its five brick gables towards the road, its highly picturesque east gable with its niche and figure of Hope, and its picturesque front towards the stable-yard with three projecting bays. As an example of the type of building erected at the middle of the seventeenth century, and of the clever use of brickwork, there are few examples of greater interest. The principal staircase is a remarkably solid construction, and with its massive newels, balusters, and handrails, well worthy of careful study.

From Scole the party proceeded to Redenhall, the church, which now serves the flourishing town of Harleston.

Redenhall Church, dedicated to St. Mary, is a magnificent example of Late Perpendicular work, superadded to an earlier church of thirteenth-century date, of which the nave arcade of five bays is the principal remnant. The church consists of chancel, with north aisle, nave and aisles, north porch and western tower, which is one of the loftiest and richest in the county. The sanctus bellcot over the chancel arch still remains. The church was restored and reseated in 1858, and is, accordingly, somewhat cold and cheerless internally, despite the large windows and ample light. Here, again, as at South Lopham, there remains a piscina in the vestry, and, curiously enough, none in the chancel, although the sedilia exist without canopies however. A piscina of Decorated date exists in the south aisle. Some remarkably fine linen panels are to be seen on the doors and the roofs of nave and aisles, one of the original Perpendicular time. An excellent brass lectern of seventeenth-century work is still in use, the eagle being double-headed. The cognisance of a double-headed eagle is also to be seen on one of the corbels of the nave roof. The rood-screen has vanished, but the painted panels, formerly in the lower portion, are still preserved in the vestry, which originally had an upper floor, and which also contains some good specimens of furniture, chairs, chests, &c. A curious little feature on the west doors is the carving of horse-shoes, pincers, and hammer, worked in with the linen panels. The north porch has an excellent vaulted ceiling and a chamber above, approached by a circular stair from the church. It is one of the best of the many excellent pieces of design in the church. The tower has on the north face the figures, in iron, 1616, but this is only a subsequent tying-up, necessitated by the effects of lightning. The font is octagonal, of a common Norfolk type, with emblems of the four Evangelists and of the Passion, the latter borne on shields by angels in alternate panels. The shaft has the lions sejant so usually found. The rebuilding of the church in the fourteenth century was due to Thomas Plantagenet, surnamed "de Brotherton," eldest son of Edward I. and Earl of Norfolk.

After luncheon at Harleston, the next visit was made to the church of Pulham St. Mary the Virgin, which has been restored in 1886 by Mr. T. Garner, who has recoloured the screen, a fine example of East Anglian type, with the double plane of tracery so frequently found in this part of the country. The chancel has been painted and decorated and a new organ inserted. Though the church is for the most part of Late Perpendicular date, an Early Decorated window in the south aisle, and some windows in the chancel of Transitional character from Decorated to Perpendicular work, evidence the existence of an earlier structure. A large number of Perpendicular carved bench ends remain, though they appear to be now affixed to seats and backs of a somewhat later date. The priest's door and the double piscina in the chancel are of Early English work. There are some interesting remains of ancient glass of the date 1380, and others of about 1420. The richest piece of work in the building is the south porch, which is one of the finest of the many excellent examples in the county, and this, notwithstanding that the church is compared with many others of smaller size, consisting of a south aisle only, besides the nave and chancel, and the usual western tower. A group-photograph of the party was taken in front of the beautiful porch by the honorary amateur photographer, Mr. J. L. Robinson, R.H.A.

From this church to that of Pulham St. Mary Magdalen is only a short drive, and the time did not allow of a sufficient fresh stock of enthusiasm to gather in the hearts of the visitors for a proper appreciation of this church, which, except in the one point of size, suffers greatly in comparison with its neighbour. The restoration and the coloured decoration, which latter is also supposed to be a restoration, were *not* by Mr. Garner, and succeeded in dissipating the small amount of energy left in the party. The church has, nevertheless, many points of interest, with its north and south aisles divided from the nave by arcades of different date and design. The work is of course mainly Perpendicular, though there are substantial remains of thirteenth-century date. The western tower is a large one, and the porch, which is here on the north by reason probably of the village being on that side of the church, is an excellent example, though by no means equal in richness to that at Pulham St. Mary the Virgin. In the ordinary parlance of the district Pulham Market is the local name of the parish of Pulham St. Mary Magdalen, and Pulham Market Hall which was not visited, a former seat of a junior branch of the Percies, is in the parish.

On the return journey, a stop was made at Thelveton Hall, but the heat of the day had by this time dissipated almost entirely the energy of the party, and the request of the owner that no illustrations of his house should be published, furnished an excuse for laziness which was almost universal. Everyone, therefore, welcomed the announcement of Mr. Robinson that he would take another group-photograph, which he accordingly did.

Thelveton Hall is a red brick Jacobean manor-house of the usual E plan, with the porch and entrance in the centre. This house is only one room deep, and as in some other instances the windows were originally apparently only on the north side, the fireplaces being on the south wall. Externally these are carried up with some simple but satisfactory chimney stacks. In the interior, besides the plan, there is little of interest, but a fine carved chimney-piece in the dining-room and some good examples of furniture, including a

remarkable carved oak sideboard. The entrance front is a very pleasing composition, with its projecting wings and centre, their gables crowned with crow-steps and ornamented at the quoins with elaborate cut brick pinnacles, and the mullioned and transomed windows and semi-circular headed doorway. The party had here a chance of judging to some extent the effect when new of the style of work seen in a dilapidated condition at Wilby. The stucco, with which the windows and other features had their brick transmuted into the semblance of stone, has been restored and renewed, and although the modern plasterer's work is not identical with that of his predecessor in the seventeenth century, either in tint or texture, and although too the bricks have deepened in tone and taken on variations of colouring, nevertheless a fair opportunity of estimating the original value of the method of architectural embellishment here presented is afforded by Thelveton Hall.

The Church of St. Andrew, at Thelveton, although it contains some points of interest, was not included in the programme, and its exclusion was justified by the listless state of the excursionists at the Hall, whose chief consideration seemed to be the lack of accommodation within a short distance for their afternoon tea. It seems that a new and somewhat difficult duty is expected from the compilers of the programme—the arrangement of the time-table with reference to the tea-table. The exceptional heat of the first two days of the excursion was, it must be allowed, some excuse for the collapse of enthusiasm. The bright, warm, sunshiny weather is very enjoyable, but the very intensity of the enjoyment produces early symptoms of laziness and fatigue. The return to Diss was made rather before programme time, whereat grumbled the lazy ones who had spent their time at Thelveton in lolling on the lawn. Such is the contrariety of human nature.

We will continue our account of the excursion next week, with additional illustrations.

THE INCORPORATED ASSOCIATION OF MUNICIPAL AND COUNTY ENGINEERS.

WE continue our special report of the annual meeting of this Association, recently held at West Bromwich. (See *Builder* for July 22 (p. 65) and August 5 (p. 101).

Municipal Electricity Works.

Mr. Robert Hammond, M.I.E.E., read a paper on "Municipal Electricity Works," prefaced by some notes on the history of the establishment of the electricity supply industry in this country. He said that up to the year 1879 very little electric lighting of any kind was done in the United Kingdom, but the introduction in that year of a new arc dynamo—which was a sound engineering job, and which could run for long spells without breaking down—caused quite an outburst of activity. The result was that almost all large works which were in operation by night, as well as by day, adopted electric lighting. In some, the electricity was "generated" at a centre for distribution over a large area, and thus the idea of central stations became familiar. Public lighting was started in the metropolis and elsewhere, but in the early eighties, there was no "private lighting" to bear its share of the standing charges, and the public lighting contracts, being taken at a loss for the sake of advertisement, were, in almost every case, not renewed on their expiry. In three places in England, however, Brighton, Eastbourne, and Hastings, public-spirited and plucky individuals kept the central stations at work, and, adopting the rough means then available for running incandescent lamps on arc circuits, gave the customers the choice of arc or incandescent lighting, and, by the actual experience of years, exemplified the ease with which incandescent electric lighting over an extended area from one centre could be accomplished. At Brighton, from the beginning, the supply was by means of overhead wires; but at Eastbourne and Hastings the distribution from the very first was effected by means of underground mains. The companies established in these places were followed by others formed by private enterprise at Liverpool, Sheffield, Bournemouth, and Bath, in the provinces, and at the Grosvenor Gallery and Kensington in the metropolis. On the passage of the Electric Lighting Act of 1882, fourteen local authorities obtained provisional orders, but until 1889 not one of them was put into force. In that year the first municipal electricity works were opened at Bradford, and these proving successful, municipal electricity works are now in operation in nine places, embracing districts so widely different as St. Pancras, Dublin, Brighton (undertaken in order to prevent a local electricity company from getting a provisional order), Hull, Nelson, and Glasgow. After giving a great deal of information in a tabulated form as to electricity works (holding statutory powers) in actual operation in the United Kingdom, and as to works in course of construction, decided upon, or projected, he proceeded to discuss the municipal aspect of the question. He said he would not embark upon a discussion as to the advisability of municipal trading. That subject had been thoroughly threshed out in connexion with water and gas supply; and it is now universally acknowledged that local authorities can with propriety become the distributors of these two commodities. Pure water is the prime necessary of human life, and though this cannot be said of gas, with regard to both it may be urged that:—(*a*) They are practically in demand by the whole body of ratepayers. (*b*) They are supplied, in any particular locality, to all consumers alike, whether rich or poor, in one uniform quality. Let us apply these tests to electricity supply. (*a*) *The demand* may certainly be regarded as *universal*, the only limit to it being the question of price. (*b*) The supply to every ratepayer, as in the case of water and gas, is bound to be uniform in quality. In the case of both water and gas supply the undertakings have, almost universally, been started by private enterprise, and subsequently acquired by local authorities when they were assured successes. Is there anything connected with electricity supply that should make such a course inadvisable. Let us first consider to what extent, if any, the ratepayers are prejudiced by the operations of a Company. If a Local Authority sanction a Provisional Order on behalf of a company, the first step of the company is to select a compulsory area, limited in extent, but comprising the choicest portion of the town from the electric lighting point of view. Ratepayers inside this area are able, by the use of the electric light, to make their places of business more attractive, to the detriment, probably, of the ratepayers outside, who cannot demand a supply for two years, and can then only obtain it under onerous conditions of guarantee, &c. How does this arrangement appeal to the Town Authorities, who are the guardians of the interests of the whole of the ratepayers and not of a select few? Presuming that a fair case can be made out for electricity supply from the commercial point of view, it should surely be the aim of a Local Authority to establish works in connexion with which a supply is placed at the disposal of the whole of the ratepayers. No company, however, would accept so onerous a condition as making the whole city or borough the *compulsory area;* whereas, in the case of the Local Authority being the undertaker under the Electric Lighting Acts, the whole city or borough practically becomes the compulsory area. It may, however, be urged that if a profitable demand present itself outside a company's compulsory area the company will, as a mere matter of business, extend its mains and enlarge its works. But in the hands of a company the growth of the undertaking must necessarily be slow. The shareholders, believing in quick returns, insist upon immediate and good dividends as the precursor to any enlargement of the capital account. The business is, therefore, often cramped for capital from the beginning, and the unfortunate ratepayers in the "outside area" are left in the lurch. A municipality can afford to take wider views. If the business be in itself sound, its aim is to develop it on an extended basis as rapidly as possible. A Local Authority can afford to make "capital extensions" without waiting for a 5 per cent. or 6 per cent. return upon the work in the compulsory area; its principal aim being, with due regard to permanent profitable results, to extend the benefit of electricity supply throughout the whole of the district under its control. Again, it is obvious that the quickest way of developing the business is to offer the supply at a cheap rate. Bradford, for instance, is charging 5d. per unit, equivalent to 2s. 6d. to 3s. per thousand feet of gas; St. Pancras, 6d. for light and 3d. for motor supply; Burton-on-Trent, 6d., &c. No companies, except those at Newcastle-upon-Tyne, have ventured upon starting with such low rates of charge as this. Far-seeing directors may be fully alive to the fact that such a bold policy is the best; but they fear the criticism of the timid shareholder, who might object to lean profits in the early stages of the business. To bring my remarks under this head to a close, I will only refer to one other municipal consideration. It is often said that in the early period of the establishment of municipal electricity works the demand will not be universal, and the works possibly conducted at a loss, and that it is unfair that the whole of the ratepayers should incur a responsibility for the benefit of a comparatively limited number. It must, however, be remembered that the introduction of electricity supply to any town raises the status of that town, and indirectly results in a benefit to the whole of the ratepayers. Large sums are constantly being voted, with scarcely a murmur, for the improvement of sanitary conditions; and the day will probably arrive when, before this very Association, a paper will be read on the iniquity of the nineteenth century in permitting the distribution, by constantly leaking pipes, under the public streets, of such a frightfully noxious thing as coal gas, and in encouraging the illumination of interiors with that which only gives out light by robbing the air of its life-giving quality, oxygen, and by returning to the air poisonous carbonic acid, to the marked lowering of the standard of health. Finally, the author dealt with the question from the commercial point of view, his conclusion being that electricity supply is based at the present stage on sound commercial lines, and that its future is all in the direction of cheaper costs. The question then for a Local Authority to decide is whether it should keep the business in its own hands or sanction its being conducted by a company. If the latter course be adopted, the Electric Lighting Acts provide for a forty-two years' tenure by the company. If an arrangement be made for an earlier purchase, it is manifest that the Local Authority will be called upon to pay a pretty heavy bonus. This, in the case of Leeds, was fixed at about 66 per cent., and in the more recent case of Reading it has been fixed at 33 per cent. It is, however, in any case manifest that the consumers are better off if supplied by the Local Authority than by a company, because the price charged by a company must cover the cost of administration by directors and also a provision of a good dividend to shareholders, whereas, in the case of supply by a Local Authority, there are no directors to pay and no fat dividends to provide. The Local Authority will easily be able to borrow the capital necessary at 3 per cent. to 3½ per cent., a rate that would hardly satisfy the shareholders in a company.

The President said they had heard so glowing an account of electric lighting as to almost make them go in for it without further consideration. But Municipal Engineers were cautious men. They knew that by waiting they had already gained largely from the experience of public companies in electric lighting; and, if they continued to wait, he thought they would still further benefit from the experience which was being gained by companies.

Mr. Cartwright (Bury) said that the paper was a very interesting and valuable one. He agreed with Mr. Hammond in saying that electric light supply should be taken up by municipal bodies, and that the areas of supply should be large: a Corporation should not provide electric light to a small central area at the expense of the ratepayers who lived in the outer districts. He had much pleasure in moving a vote of thanks to Mr. Hammond for his instructive paper.

Mr. Boulnois (Liverpool) said he cordially seconded the vote of thanks to Mr. Hammond, but, at the same time, he was obliged to take exception to the assumption that electric lighting, or even gas, was on a par with water. Water was a commodity of vital necessity to communities, and on that ground municipalities were justified in keeping control of it. But the same could not be said of gas or electric lighting. The latter was, as yet, only in its experimental stage, and on that ground it behoved public bodies to be very careful in their choice of plant. He thought there was too great a tendency to municipal trading in some directions.

The annual dinner of the members of the Association was held in the Masonic Hall, West Bromwich. The President (Mr. J. T. Eayrs, C.E.), presided, and was supported by the Mayor (Councillor Akrill), the Deputy-Mayor (Councillor Salter), most of the members of the Council, and Corporate officials, and most of the members of the Association attending the Conference.

Sewage Difficulties at Nuneaton.

On the following day a paper was read by Mr. J. S. Pickering, Assoc. M. Inst. C.E., Surveyor to the Nuneaton and Chilvers Coton Local

Board, on "Sewage Difficulties at Nuneaton, and how they have been solved." He said that few towns had experienced greater difficulties in dealing with their sewage than Nuneaton. Previous to the author's appointment as Engineer and Surveyor to the Local Board, three years ago, apparently disheartened by repeated failures the sanitary authority had allowed their sewage works to lapse into a perfect pestiferous morass, and it was not until a perpetual injunction restraining them from further polluting the stream was about to be enforced, that they determined at any cost to effectually treat the sewage of their district, if it were possible to do so.

Upon laying out the original scheme no suitable land within a reasonable distance of the town appears to have been available, and now, after over twenty years' development of the town, and the introduction of new industries contributing to the sewers, the sewage is of such a nature that it is questionable whether ordinary crops would not be destroyed by it.

The following extract from a long article in *Engineering* of September 11, 1874, will give some idea of the nature of the sewage to be dealt with:—

"The sewage presented some extraordinary characteristics. It was literally loaded with animal matter, appeared thick as if mixed with size, and afforded such an abominable stench of decomposed animal substances as made it impossible to conduct its analysis except in the open air. . . . The Nuneaton people are to be pitied. They have to deal with a sewage so strong that we affirm no chemical process extant can battle with it. We have tried it experimentally in its natural state with all the known processes, and all signally failed to purify it. If any of our readers desire to see a most complete instance of sewage difficulty we advise them to visit Nuneaton."

These remarks with regard to the nature of the sewage are equally appropriate to-day as they were nineteen years ago. Experts and engineers who have visited the works are unanimous in their opinion that the sewage at the outfall could scarcely be of a worse description for treatment. The dry weather flow is about 400,000 gals. per day, or 36 gals. per head per day, the population contributing to the sewers being about 11,000. Considering that scarcely one-third the houses are provided with water-closets, the quantity of sewage to be dealt with is very large; but this is due to the fact that nearly one-third the quantity is received from factories. These consist of fellmongers', wool-scourers', and hat factories. Those who are acquainted with the processes of these trades will understand somewhat of the description of sewage received at the outfall.

During the summer of last year the Local Board engaged Dr. Angell (public analyst for Hants) to make a series of analyses, and to report generally upon the sewage treatment. Dr. Angell occupied a full week in making his investigations, and presented a very valuable report to the Board. Referring to the sewage, he says, "it is four or five times stronger than average sewage."

Not only is the liquid sewage of an exceptional character, but the solid matter is very excessive. In designing plant for the disposal of sewage-sludge, it is usual to estimate the quantity to be dealt with at from 1 to 2 tons per 1,000 population. The population contributing to the sewerage system being 11,000, basing the calculation on the highest quantity usually estimated, 22 tons should be the quantity of sludge produced per day, whereas there is actually between 57 and 58 tons per day.

The foul sewage which finds its way to the Outfall Works has to be rendered as innocuous as it is possible to make it, as, after treatment it is discharged into an extremely sluggish stream, the quantity of water flowing along which is during the summer months less than the volume of sewage effluent discharged into it. The stream, too, passes through several large estates, and four miles or so below the Outfall Works it is dammed back to form an ornamental lake close to Caldecote Hall, the residence of Captain Townshend. Under the conditions described, it will be seen that the sewage difficulties at Nuneaton are by no means imaginary.

It has been previously mentioned that treatment by land has always been considered out of the question. The method adopted, then, has, until recently, been one of purely chemical precipitation. The whole works stand on less than six acres of ground, and are within 600 yards of Nuneaton Market Place. For many years the lime process was in vogue, and after the evils of this system had become apparent, the lime and alumina process was adopted. It appears to have been entirely overlooked that the sewage itself was intensely alkaline, and the addition of further lime only added to the nuisance caused by secondary decomposition, which took place in the stream. Chemical precipitation has now been supplemented by filtration through sand and "polarite," the latter being a very hard, porous, and absorptive mineral substance manufactured by the International Water and Sewage Purification Company.

The author having given a detailed description of the sewage works, which have been enlarged and remodelled by him during the last three years, described the filters, which, he said, should not be used unnecessarily in removing large quantities of matter in suspension. The filters are formed of several layers of broken stone, of sizes varying from 3 in. to pea-size, making a total depth of 12 in., over which there is a 12-in. layer of sand and "polarite" in equal quantities, and above this a 12-in. layer of coarse Leighton Buzzard sand. There are eight filters, arranged in two sets of four, and each filter has an area of 100 square yards. One set of filters is kept in use while the other set is being cleansed and allowed to rest for the purpose of revivification. The cleansing of the filters is effected simply by allowing the filtered effluent from any three filters in a set to work upwards through the filter requiring to be washed. By this means the flocculent matter which collects on the surface of the filters is removed, and flows away with the small quantity of water used for cleansing, which is distributed over a small plot of land. One set of filters is washed by this means every day.

Taking into consideration the very foul sewage dealt with, the effluents discharged into the stream are excellent. In appearance they are bright and colourless, and it is only occasionally that there is a very slight—almost imperceptible—odour. The effluents invariably improve by keeping. Samples which have a slight odour when taken are practically odourless after being kept a day or two, and retain their good qualities even if kept in stoppered bottles for weeks. As gauged by the "albuminoid ammonia" test, the effluents usually show about ·3 parts per 100,000, and occasionally are reduced to between ·2 and ·3. These figures are merely rough averages from some scores of analyses which have been recently made. Although, chemically, not first-class results, the percentages of purification are very high, on account of the crude sewage being so abnormal in albuminoid ammonia.

The Commissions appointed in 1868 to inquire into the best means of preventing the pollution of rivers suggested certain fixed chemical standards for liquids discharged into streams. These suggested standards, if carried into law, would have dealt hardly with a manufacturing town like Nuneaton, notwithstanding the highly successful treatment of their sewage. It is impracticable to fix a standard applicable to all cases. What may be a comparatively easy task in a residential town may be a practical impossibility in a manufacturing town. Should, however, a standard of purity be fixed by the legislature, it must in many manufacturing towns open up the important question of the admission to the sewers of manufacturers' refuse liquors. In this respect, there is certainly room for further legislation. Apart from the difficulty of disposal of sewage, which is mixed with these waste liquors, there is the important question as to whether the general ratepayers of a district should be burdened with the expense of such disposal. It may be suggested that manufacturers are themselves heavy ratepayers and are large employers of labour. But it must not be forgotten that neither of these good offices is indulged in from philanthropic motives. It is purely from a financial motive that their businesses are carried on, and, in the author's opinion, the cost of dealing with their waste liquors should be considered as a necessary item in their working expenses. The question as to whether the sanitary authority should undertake the treatment, should be entirely a matter of arrangement between the authority and the manufacturer. Unless the manufacturer is charged for the privilege of conveying his waste liquors to the sewers, it becomes necessary to rate the district to enable him to make profits. Manufacturers, too, who happen to have no waste liquors from their manufacturing processes, or who are outside the drainage area, have to bear their proportion of the general expenses. Section 7 of the Rivers Pollution Prevention Act, 1876, compels a sanitary authority to give facilities for enabling manufacturers to carry liquids proceeding from their factories into the sewers, provided that such liquids do not "prejudically affect such sewers, or the disposal by sale, application to land, or otherwise, of the sewage matter conveyed along such sewers, or which would, from its temperature or otherwise, be injurious in a sanitary point of view." Section 17 of the Public Health Acts Amendment Act, 1890, further prohibits the entry into the sewers of any chemical refuse or liquid at a higher temperature than 110 deg. F., "which alone, or in combination with the sewage, causes a nuisance, or is dangerous to health." Neither of these sections is very valuable to an authority whose system of sewage disposal is a purely chemical one. The question may be, as is the case at Nuneaton, merely a matter of expense at the Outfall Works.

After making careful and prolonged trials with nearly all the sewage precipitants in the market, and giving up the sewage works to the various patentees and sewage companies for trials, it is impossible at Nuneaton to get a fair tank effluent with less than thirty to forty grains of chemicals to the gallon, and even with this large quantity of chemicals added the sewage has frequently to be turned back for re-treatment. The precipitant giving the best results is a mixture of sulphate of alumina (Spence's "aluminoferric") and a special preparation of "ferozone" for deodorizing purposes. During the few holidays when the factories cease work a very good tank effluent can be obtained with from six to ten grains of chemicals per gallon, thus showing the enormous additional expenses entailed in dealing with the manufacturers' liquors.

As may be imagined, the working expenses at the sewage works are very heavy. The present expenditure is at the rate of 1,600*l.* annually, between 500*l.* and 600*l.* of which is expended in chemicals alone.

In resolving to deal with their sewage effectually the sanitary authority have placed financial considerations as quite secondary, feeling this was a matter to be considered when a good result had been obtained. They have so far been rewarded by seeing the stream, which had been polluted for twenty years, once more assume its natural appearance. During the summer of last year (before the completion of the new works) volumes of letters were received from riparian owners complaining, not without reason, of the foul condition of the stream. It was described as "a constant stream of pure sewage, of a milky white, like thick limewash, the stench being *most horrible*." For some time the white appearance of the stream remained a mystery. Although an enormous quantity of chemicals were being used for precipitation purposes, and no alkaline effluents were discharged, the stream presented the appearance described above. At one time there was some doubt as to whether the nuisance could be remedied, as the real cause could not be ascertained. The remedy, however, remained not so much with the Board as with the manufacturers. Their refuse liquors were discharged into the sewers without any treatment, at irregular intervals, and in varying volumes, and consequently did not mix uniformly with the ordinary sewage of the district. From Dr. Angell's report it appeared that the waste liquors from the woolscourers re-acted upon the waste liquors from the fellmongers, and produced the white lime soaps and lime carbonate compounds, with organic flocculent matters complained of, in the river. In consequence of the intermittent and uncontrolled manner in which these liquors were allowed to pass into the sewers it was uncertain whether this unsightly chemical precipitation would take place in the sewers, in the tanks at the Outfall Works, or in the deep still pools of the river below the Sewage Works. After careful consideration it was resolved to ask the manufacturers to neutralise their refuse liquors with sulphuric acid before discharging them into the sewers, and to allow them to flow in one continuous stream during the day. The manufacturers met the Board in a fair spirit and carried out works to meet their requirements, with a result that the difficulties of disposal have been greatly diminished and the objectionable whiteness in the river has entirely disappeared.

The recent prolonged drought has been a severe test for the new Disposal Works, but no nuisance of any description has existed in the stream since their completion.

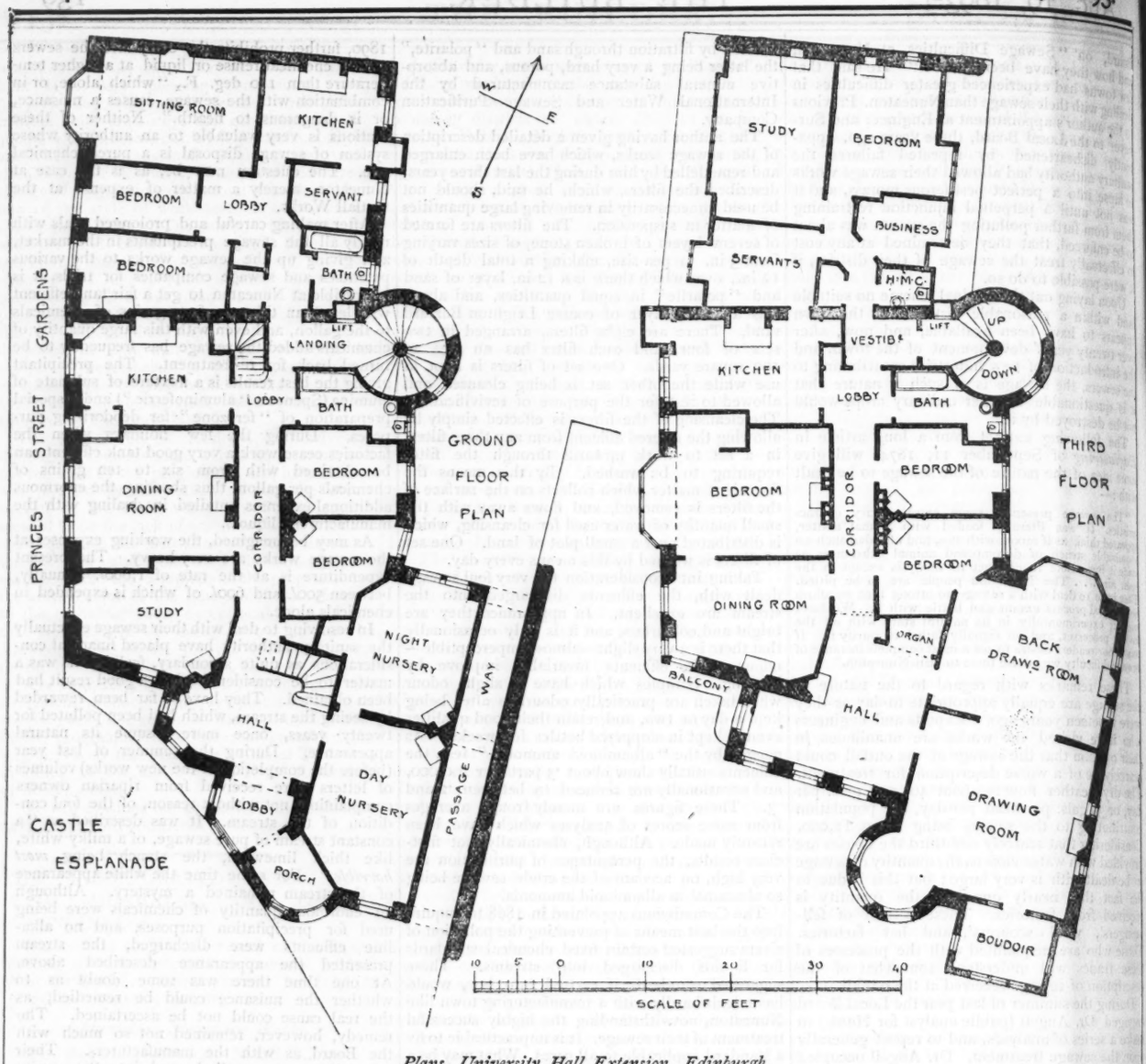
The success which has attended the efforts of the Nuneaton Sanitary Authority may be briefly attributed to the following reasons:—

1. The treatment by the manufacturers at their own works of their refuse liquors.

2. The use of sufficient and proper chemicals to effect thorough clarification.

3. The use of "polarite" filters, which remove putrefactive matters in solution, which no quantity of chemicals has been found to do by precipitation.

4. The provision of pumping machinery of



Plans, University Hall Extension, Edinburgh.

ample capacity for raising the sewage for treatment in as fresh a state as possible.

5. The arrangement for turning back the sewage for re-treatment; and

6, but by no means the least important, the determination of the sanitary authority to surmount their enormous difficulties.

There were a few other papers read at this meeting, to which we may return.

Illustrations.

OXFORD MUNICIPAL BUILDINGS.

THE illustration gives a view of the new Municipal Buildings for Oxford as the building is now being carried out, some slight modifications having been made in the design since it was accepted in competition.

We gave a description and plan of the building shortly after the competition was decided (see *Builder* for June 25, and July 9, 1892), and it is therefore unnecessary to repeat any detailed description here. The two fronts are to be faced with Clipsham stone and the roof covered with stone slates. The foundation stone was laid on July 6, and the work is now proceeding rapidly.

Mr. Chappell, of Pimlico, is the contractor; the architect is Mr. H. T. Hare; and the drawing from which the illustration is taken was exhibited in this year's Royal Academy.

HOUSE (BASED ON BRAMALL HALL).

THIS is an illustration of the entrance front of a house, the design of which is based on Bramall Hall, Cheshire. The design was made for a gentleman who is a member of the family who owned and lived in this old house, and the idea was to design a house having a plan suitable for modern requirements with the elevation as near in design as possible to Bramall Hall.

The house will be built of brick walls where possible, faced with "half timber" work, which will be stained dark brown foiled. The roofs will be tiled.

The drawing is by the architect, Mr. R. A. Briggs, F.R.I.B.A., and was hung in this year's Royal Academy Exhibition.

ARCHITECTURAL ASSOCIATION EXCURSION: SKETCHES.

THE sketches here given were specially made by Mr. Arnold Mitchell, as reminiscences of picturesque bits in the places visited during the annual excursion of the Architectural Association, which has taken place this week. Most of them will be referred to in the articles descriptive of the excursion, in this and the following week's issue.

NIXON'S SCHOOL, OXFORD.

THE clearing of the site for the new Municipal Buildings at Oxford, on the east side of St. Aldate's, has included the demolition of an interesting and picturesque bit of old Oxford, known as Nixon's School. It formed the south side of a small court-yard at the rear of the site. The building was, with the exception of a doorway at the east end of the north front, entirely of wood and plaster. The ground story was arcaded with three depressed arches resting on circular columns, with a slight entasis, 9 in. in diameter at the top, and 11 in. just above the base mould. To the east was the doorway before mentioned, which was of stone, and formerly had a shield with the arms of the City of Oxford over it. This shield had disappeared when our drawing was taken. Three shields, now blank, of wood, project from the cornice over the arcade, and between them runs an inscription—"[J.] Nixon, Esq. [erected] this SCHOOL for GENTLEMEN'S SONS, and Endow'd it with THIRTY POVNDS annually FOR EVER." The initial J. has disappeared, and the word "erected" is very indistinct. The date of Alderman John Nixon's foundation was 1658. For some time the lower part was used in connexion with the Post Office, but for some time before its destruction it was a wood shed. The upper story had three large casement windows, with plaster gables over. The centre window projects about 2 ft. from the wall face, and had angle pilasters of good design. Over it was a wooden shield of similar character to those over the lower arcade. A window at the west end had a good cornice over. The roof was tiled.

UNIVERSITY HALL EXTENSION: EDINBURGH.

SIX years ago a small residential hall for students was inaugurated in Edinburgh by Professor Patrick Geddes, with the object of combining some of the advantages of collegiate life, as existing at the English Universities, with the more practical needs and, generally, shorter purse, of the average Scottish undergraduate. The experiment has proved itself a success, the institution having steadily grown (from a small

beginning of seven students) until it now comprises two separate halls with between thirty and forty students in residence. The second of the two halls already established (in Riddle's-court, Lawnmarket) has gained the further object of rescuing from squalor and preserving to the city old Bailie Macmorran's house, one of the most interesting and historical of the old Edinburgh dwellings, where royalty has been more than once entertained by the civic authorities in bygone days.

The success of the scheme has induced Professor Geddes to undertake a wider development, in which not only accommodation in separate "halls" will be provided for students, but also dwelling-houses for some of those interested in, or connected with, the scheme. In this way it is intended that the students in residence shall be brought into social contact, not only with each other in all the Faculties, but also with their seniors in University life, and, more intimately than at present, with outside social influences. When completed, the scheme will form an important architectural contribution to the "old town" of Edinburgh, occupying a very prominent site on the steep, irregular slope of the Castle Hill. The buildings form two sides of a quadrangle, west and north, the former fronting the Castle esplanade on its southern side, and extending down the rapid slope of the hill in a series of descending buildings, the latter facing Princes'-street in a single terrace, with the valley of the old "Nor' Loch" intervening. The western portion has been first proceeded with, from the designs of Mr. S. Henbest Capper, M.A., A.R.I.B.A.; the northern portion being designed by Messrs. Sydney Mitchell, & Wilson. The view given is from the Castle esplanade, looking north-east; the block comprises seven different houses, varying in size from six to twenty rooms. The extreme irregularity of the site, both in area and level (there being a drop of 40 ft. from south to north on the western front), has necessitated a corresponding irregularity of plan; two blocks (out of three forming the western portion) are completed and shown in the illustration; plans of two floors are also given, forming the ground and third floors above the Castle esplanade (the latter being Professor Geddes's own house). The houses are all entered from the circular stair, beside which is a luggage lift; on the ground floor is a separate entrance to the largest house, which extends to the floor above, and also to a basement. The building, occupying the highest site in the city outside the castle, and overlooking both the Esplanade and the beautiful Princes'-street Gardens (a public park), commands very notable views all round. In keeping with its site, as a fitting adjunct to the historical Lawnmarket and Castle-hill, it has been designed in revival of the old Scottish Domestic architecture so characteristic of Old Edinburgh, of which important specimens have come down to us in John Knox's house, the Marquis of Huntly's town mansion, and others. The buildings are of stone "harled" (*i.e.*, rough-cast) in cement, with red freestone dressings; projecting eaves and windows, balconies, &c., have been introduced as in character with the style and suitable for such a situation; the roofs are partly tiled, partly slated with Aberfoyle green slates. The contractor was Mr. James Slater. The perspective is a drawing by Mr. T. Raffles Davison.

NOTES ON HYDRAULIC FORMULÆ.*

THE object of the author in placing these notes before the members of the Association is, first, to show the unsatisfactory state of the present position as regards the formulæ in general use for determining the discharge over weirs, and of sewers; and second, to suggest, if not a remedy, at least a means by which the question may be placed on a more satisfactory footing.

With regard to weirs of small size, such, for instance, as are frequently employed in estimating the discharge of streams for purposes of water-supply and the discharge of sewers, the published tables are generally based upon the formulæ $Q = 214\sqrt{h^3}$. The experiments of Castel, Smeaton, Blackwell, and other observers, however, show that the co-efficient varies with the width of the weir relatively to the channel in which it is placed, and with other conditions, so that if any approach to accuracy is desired, all the circumstances must be taken into account in determining the value of the co-efficient to be employed. As an instance, the case of a weir 1 ft. in width, with a depth on the sill of 3 in., may be considered. Here, according to the formula quoted, the discharge would be 26·75 cubic ft. per minute. But, in gauging a small stream, Castel found that the accurate discharge would be given by the formula—

$$Q = 3{\cdot}21 \times l \times H \times \sqrt{H}$$

where

Q = discharge in cubic feet per second,
l = length of weir,
H = head on sill of weir,

and the discharge, in the case under consideration, would be 24·00 cubic feet per minute, or about 10 per cent. less than that given by the formula first noted. It will be apparent to the members of the Association that this discrepancy might, in some cases, be productive of grave consequences to those relying upon the accuracy of the first formula given. We cannot follow the subject farther in a short paper, but the author hopes that members may be induced to investigate the subject, in cases where sewers under their care discharge into settling tanks, and where the actual facts can be ascertained by direct measurement.

With regard to the much larger subject of the formulæ applicable to sewers, the existing state of affairs is lamentable in the extreme, and it is somewhat remarkable that a country which boasts a foremost position as regards the construction of sewerage works, should have made no attempt to solve the difficulty. Millions sterling are spent every year on these works, and yet there are, so far as the author is aware, absolutely no reliable observations to be found which deal in anything like a proper and comprehensive way with the subject. We have an Ordnance Survey conducted at great cost, and productive of the best results; why not, therefore, a comprehensive series of experiments on the flow of liquids, such as sewage, in channels of stoneware and brickwork, such as local authorities are for ever spending large sums upon? The information would prove of very great value to the community at large, and it is not unreasonable to ask that the Local Government Board should ask Government for a grant of money in order to carry out so desirable an object.

The author is aware of the experiments by Darcy and Bazin, and other observers, and most valuable and instructive they are; but they were generally made with clean water, and curiously enough, although the experimenters named found that the condition of the surface of the channel, as regards roughness, exercised a very considerable amount of influence on the velocity of the liquid flowing along it, and although brickwork is very commonly used in sewer construction, in either the circular or egg-shaped form of section, yet the experiments to determine the co-efficient of roughness for that material were made upon a channel of rectangular cross section, and it by no means follows that the results are fairly applicable to channels of the sections referred to, as commonly constructed.

It may be convenient here to note the formulæ in general use, and it may be stated at the outset that the fundamental formula is that of Chezy, in which $v = C\sqrt{rs}$, where

v = velocity in feet per second,
r = hydraulic mean radius,
s = slope of the surface,
C = a co-efficient.

It will be noted at once that the values of r and s may be readily ascertained when the fall and dimensions of the channel are known, but to find a proper value for C has been the most difficult of problems, and indeed one that still remains unsolved. Consider, for instance, the case of the formula very commonly used, that of Eytelwein; in this case C has a constant value of about 93; but Darcy's experiments showed that C should vary from about 60 to 147, according to the size and condition of the channel! Another well-known formula is that of Weisbach, which, as usually written, is of a complex character; but it is capable of simplification, and may be written thus:—

$$v = \sqrt{\left(\frac{257{\cdot}6\, r\, s}{c}\right)}.$$

In this case c is a co-efficient varying with the velocity, its value for a velocity of 2 ft. per second being ·0263, and for that of 6 ft. per second ·0213, with, of course, intermediate values for velocities between those quoted. As written above, the formula agrees very closely indeed with that of Neville, which is as follows:—

$$v = 140\sqrt{r\,s} - 11\sqrt[3]{r\,s}.$$

In both these formulæ, v = feet per second.

Having referred to the leading authorities, we may next see how they agree with results obtained by the author, although these are, indeed, far too few to do more than prove the accuracy of the opening remarks by him.

It is well known that the main outfall sewers of the metropolis were designed in accordance with Eytelwein's formula, but it is only recently that means for accurately ascertaining their discharging capacity have been provided. It has always been assumed that the northern outfall would discharge 33,000 cubic ft. per minute, and as recently as 1891, when Sir Benjamin Baker and Mr. Binnie presented a joint report upon the drainage of the metropolis, there was nothing in the shape of reliable data obtained experimentally to show that the assumption was an incorrect one. But since means have been provided for ascertaining the discharge, within reasonable limits of accuracy, it has been demonstrated that the outfall will discharge at least 33 per cent. more than it was calculated to, and this is more or less true of the other main sewers, which will account for the former inadequacy of the main pumps to deal with the volumes brought down in times of heavy rainfall, and the consequent provision of auxiliary engines at Crossness, and at the Western pumping station. It is hardly necessary to remark that pumps do not discharge, as a rule, more than the calculated quantity. Another fact in support of the statement given above is, that soon after the works were inaugurated it was found necessary to lower the sills of the permanent storm-overflow weirs at Old Ford, because a much larger volume was brought to them than was anticipated, and indeed it will be apparent to the members that cases may arise in which serious results would ensue upon the discharge of volumes so much in excess of those calculated upon.

The author has also made some experiments upon much smaller sewers than the northern outfall, and in these cases also, all the authorities quoted were found to be incorrect to the extent of from about 10 to 70 per cent. The formula by Kutter, which has of late been much noticed, must be used with very great care, since the values given for n, the co-efficient of roughness, have much more importance than at first sight appears to be the case.

After carefully testing this formula, the author is of opinion that it is in no respect superior to that of Darcy, if, indeed, it is as good. Very great care must be exercised in selecting a proper value for n, and the one for brickwork, namely, ·013, is not high enough for large sewers, and is far too large for small ones. Here is the formula for the information of those interested in the question:—

$$v = \left\{\frac{1{\cdot}811}{n} + 41{\cdot}6 + \frac{{\cdot}00281}{s} \Big/ 1 + \left(41{\cdot}6 + \frac{{\cdot}00281}{s}\right)\frac{n}{\sqrt{r}}\right\}\sqrt{rs}.$$

It will be observed that the expression within the brackets contains n, the value of which varies from ·009 to ·035 according to the nature of the channel or river, and the utmost care and much experience are desirable in employing this formula, although, perhaps, this is equally true of others also.

Darcy's formulæ is as follows for brickwork:

$$v = \sqrt{\frac{2g}{m}}\sqrt{rs} = c\sqrt{rs},$$

$$\text{where } m = a\left(1 + \frac{B}{r}\right),$$

a being = ·0037285, and B = ·229663.

The author is of opinion that the results obtained by the use of this formula are, for sewers, superior to those obtained by any other at present employed, although further experiments are very much wanted in order to determine the proper values of a and B. With the figures given, c ranges in value from 78 for 6-in. pipes to 126 for sewers 10 ft. in diameter.

In conclusion, the author feels that it rests with the municipal engineers of to-day to solve the problem. Many of them have charge of sewage works with open channels, and with tanks, in which the discharge can be accurately measured. If they will take the trouble to make the observations, the author will be happy to tabulate the results and send them to this Association. It is hardly necessary to say that extreme accuracy is desirable. The water should be "in train," *i.e.*, it should have the same sectional area throughout the length of channel experimented upon; the invert slope, which, if the water is in train will be the same as the surface slope, should be accurately taken; the channel should be free from

* Being a paper read by Mr. W. Santo Crimp, M.Inst.C.E., at the recent meeting of the Association of Municipal and County Engineers, West Bromwich.

deposit, and its nature should be carefully noted, together with its shape. These details, in say a hundred cases, would prove of the very highest value to the municipal engineer, and to the community at large.

In some cases, a very close approximation to the mean velocity may be obtained by the use of a coloured liquid of about the same specific gravity as the sewage, introduced into the channel just above the higher of the points of observation. A small cloud is at once formed, and as it flows past the point referred to, the time should be noted when its centre is opposite the mark. As it flows down the channel it becomes elongated by reason of the different velocities of the liquid at varying depths, and some little difficulty will be experienced in noting the centre of the cloud as it passes the lower point of observation, but if the points are not too far apart, a very fair result may be obtained, and the author hopes members may be induced to try experiments wherever practicable in the direction indicated, noting at the same time the surface velocity, as found by means of floats. The author is satisfied that if this is done much of the confusion now prevailing will be remedied, and the whole question, as regards sewers at any rate, will be placed on a satisfactory basis.

Books.

Molesworth's Pocket Book of Engineering Formulæ. (Twenty-third Edition.) London: E. & F. N. Spon.

THE preface to the first edition of this well-known pocket book is dated November, 1862, and to prove its popularity among engineers it is only necessary to refer to the fact that in thirty years its sale should have run through twenty-two editions. Our readers must not imagine that the new edition just issued is a mere reprint of former editions with additions. On the contrary, the whole matter appears to have been carefully revised, the sequence of data thoroughly studied, and the formulæ relating thereto systematically arranged. The index also has been considerably enlarged and improved. In the place of an index consisting of thirty double-column pages, including the index to the supplement contained in the previous edition, we have now forty-six and a half double-column pages, so well compiled that reference involves no undue labour.

The twenty-second edition contains 732 pages of subject-matter, including a supplement of 17 pages upon electric lighting. The information contained in this supplement was useful, but we always regret additional matter being printed as a supplement in a handy-book for rapid inspection, as its independent existence at the end of a volume is almost sure to be forgotten when searching for information in the hurry of business. The present volume contains 735 consecutive pages without a supplement. Additional matter is presented upon the following, among other subjects:— Oil and gas-engines, submarine mining, moorings and buoys, methods of sounding, tests of steel, proportion of crane-hooks, railways and cable tramways, strength of riveted joints, table of the bearing and shearing areas of rivets, modern sections for pillars and their strength, corrugated flooring for bridges, and terms used in carpentry.

General de Lisle's earthwork tables are omitted, and other earthwork tables substituted. A useful comparison of formulæ for the flow of water in channels is given, also the focal length of lenses and the areas, together with the circumference of wire to the new legal standard wire gauge, which, by order of Council, came into operation March 1, 1884, while upon another page is given the diameter of the gauge in inches, and its comparison with other recognised gauges is clearly indicated.

Another good feature of the book is, that it is not overburdened with advertisements; and its compact size (outside dimensions 5 in. by 3¼ in. by 1 in.), renders it convenient for the pocket. To the twenty-second edition, the name of Sir Guilford L. Molesworth alone was attached; but in the twenty-third edition we find his name coupled with that of Mr. Robert Bridges Molesworth, M.A., Cantab. The latter name bears also the designation of Assoc.Mem.Inst.,C.E., and considering that Sir Guilford Molesworth is a member of the Council of the Institution of Civil Engineers, we are somewhat surprised to observe that the description of his rank in scientific societies is limited upon the title-page to Member of the Institute of Mechanical Engineers, it being well known in the profession that while all auxiliary engineering associations have their special importance, the title of full membership in the Institution of Civil Engineers is deemed of greater value, in the same way as Fellowship in the Royal Institute of British Architects is recognised as a higher qualification than membership in junior architectural societies.

Practical Surveying (Third Edition). By G. W. Usill, Assoc.Mem.Inst.C.E. London: Crosby Lockwood & Son.

IN perusing the new edition of this compact and well illustrated text-book, we are inclined to ask the question, do fresh editions of text-books always include every alteration and improvement desired by an author; or do publishers assert that such alterations will render the reproduction too costly by upsetting the arrangement of pages. Additional pages are often permitted in a new edition, but a work is not always so thoroughly revised as might be wished.

In our issue, dated February 12, 1887 (page 268), we reviewed the fourth edition of *Merrett's Surveying*, to which Mr. Usill had added a useful appendix. The plans for teaching survey work in Merrett's book are excellent, but Mr. Usill probably finding it difficult to include all he desired to add, especially upon the subject of taking levels, brought out a book of his own, which has now deservedly reached a third edition. We regret, however, that some of the points noted in the review of his work, which we gave in our issue of June 8, 1889, have been passed over in his third edition, perhaps for the reasons above-stated. Respecting the level book, we are glad to read the footnote upon page 202, although we maintain the views given thereon in our previous criticism. Designed, however, as a text-book for students, the work contains so many practical remarks, that we can confidently recommend its study by young beginners, but we advise them to leave their minds open for adapting the suggestions contained in our previous notice, to the system they may adopt as practitioners.

A Collection of the Statutes regulating Building within the Administrative County of London, with Concise Notes and Cross References. By W. R. Griffith, Barrister. London: W. Clowes & Sons. (1893.)

THE most striking point about this book is that it shows the need for a consolidation of the Metropolitan Building Acts. The work begins with the Metropolitan Building Act, 1774, and contains no less than eighteen Acts or parts of Acts within its pages. It is, in the chaotic state of this branch of the law, a fairly useful book, because within a small compass the several enactments relating to building in London can be found with business-like and short notes. There is really no more to be said about a book which has no ambitious aims, and which does not profess to be more than a collection of statutes, bye-laws, and forms.

GLASGOW ARCHITECTURAL ASSOCIATION.—The usual monthly meeting of this Association was held in the rooms, 114, West Campbell-street, on the 1st inst.—Mr. Wm. Conner, A.R.I.B.A., in the chair—when a paper was read by Mr. Wm. Cowie, A.R.I.B.A., on "Church Planning." Treating the subject at first in a historical manner, the lecturer traversed the various developments of plan arising from precedent and necessity. He then proceeded to deal at length with various points in the planning of modern churches, especial reference being made to the acoustics. Mr. Andrew Robertson, A.R.I.B.A., opened the discussion, and at the close a hearty vote of thanks was awarded the essayist.

THE SANITARY INSTITUTE EXAMINTIONS.—At an examination for inspectors of nuisances, held at Cardiff on July 28 and 29, 1893, thirty candidates presented themselves. In the case of one candidate the examiners have not yet come to a decision, but the following sixteen candidates were certified, as regards their sanitary knowledge, competent to discharge the duties of inspectors of nuisances:— James Bullock, Brockley, S.E.; Thomas Cawsey, Pontypridd; R. B. Chouler, Port Talbot; John Coombe Cowling, Launceston; Samuel Evans, Canton, Cardiff; Frank Glover, Roath, Cardiff; Stephen J. Holbourn, Cardiff; John White Holden, Roath, Cardiff; David Jenkins, Cardiff; Thomas Jones, Neath; Arthur Edward Mills, Wells, Somerset; Evan Thomas Morgan, Pontypridd; Charles Moore, Wrexham; Alfred Pearce Preston, Cardiff; John William Riggs, Torquay; Frank Robert Slade, Bristol.

Correspondence.

To the Editor of THE BUILDER.

GLASGOW MUNICIPAL BUILDINGS.

SIR,—In his letter on page 125 Mr. W. Young says that the waste-pipes are trapped off at the bottom and ventilated to above the roof, and being so it is absurd to suppose that drain-air from them could get out anywhere. It is not so absurd, however, if it be the case, as Mr. Fyfe's report seems to assert—viz., that air-pipes from off the soil-pipes have been led back into rain-pipes or waste-pipes.

If it be true that air-pipes from off the soil-pipes are joined into either the waste-pipes or rain-pipes, or into both, then no "very big if" is needed to tell us that smoke put into the soil-pipes, *or into the drains in free communication with them*, could easily pass into either or both the waste-pipes and rain-pipes. Or, if the smoke were put into the rain-pipes or waste-pipes, which have air-pipes from the soil-pipes connected into them, then said smoke could easily pass through these air-pipes into the soil-pipes. Then as to ventilating the soil-pipes by means of a drain-pipe connected "to the back of the boilers," may we ask what guarantee existed that bad smells from the drain ventilating-pipe so connected would not come into the building should the fires be off for some time?

Mr. Young says on page 125 that the anemometer showed a down-draught in all the soil-pipes. Mr. Fyfe, however, asserts that his anemometer showed a down current in very few of them—which is right?

Further, is the plan good or bad? I think it bad. In Mr. Fyfe's report it is stated that the disconnecting traps used on the drains are the old-fashioned, inaccessible, and non-ventilating "sow-back" ones. We are entitled to ask why this is so when for a number of years back hundreds of landlords in Glasgow have been forced by the action of the sanitary authorities to take out these "sow-back" traps from their properties and put in others of newer design? SANITARIAN.

P.S.—In his letter, Mr. Young also states:— "They had the best official advice in the ripe experience of the late City Architect, who took a special interest in all the sanitary work." Now as this seems to imply that the late Mr. Carrick was consulted in the matter and looked after the work so far while it was going on, and if so he would be to blame partly if anything was badly planned or wrongly done, I beg to challenge the statement. I understand that Mr. Young insisted on the work being done as he (Mr. Young) wished. S.

The Student's Column.

GEOLOGY.—VIII.

THE MINERAL CONSTITUTION OF ROCKS.

HAVING described the more salient of the rock-forming minerals, we are now in a position to refer to the various kinds of stone made up of them. Before commencing, it will be well to mention a few physical features connected with the subject.

As we have previously remarked, a "rock" may be constituted of one mineral only, or of a number of minerals. Some of these were formed when the rock was first made, and have undergone but little change; these are called *original* minerals. Others—a numerous class—did not make their appearance until a subsequent period, filling up the cavities left by original minerals, or molecularly replacing or occupying spaces between them; these are termed *secondary* minerals.

In a rock containing several minerals some will be sure to predominate; these are termed *essential*; whilst the less abundant, or rarely occurring, are known as *accessory*. Rocks may be *crystalline*, composed of crystals; *semi-crystalline*, in which the minerals are only incipiently, or, in part, imperfectly crystallised; *earthy*, not containing crystalline minerals; *vitreous*, like bottle glass; *flinty*, having a dull texture; *clastic*, composed of fragments, or detritus; *granular*, made of irregular little grains of mineral matter; *stratified*, exhibiting layers or beds running more or less parallel to each other; *laminated*, occurring in leaf-like layers; *massive*, non-stratified, having no definite arrangement; *foliated*, composed of minerals in wavy layers, each essential mineral constituting a distinct layer; *schistose*, similar to foliated, except that, as a rule, the layers are much thinner and occur in sinuous or tortuous lines; *vesicular*, as applied to lavas, full of little holes; or, *amygdaloidal*, where the vesicles or cavities alluded to have been entirely, or partially, filled up by mineral matter. The foregoing comprise some of the terms most commonly applied to *rock structure* on a large scale, and the student should commit them to memory.

In regard to their composition, rocks are said to be *siliceous* when they contain large proportions of free silica; *felspathic*, when felspars are principally in evidence; *quartzose*, when composed of quartz; *argillaceous*, of clay; *calcareous*, of lime; *arenaceous*, of sand; and so on.

Igneous.—The mineral constitution of igneous rocks is extremely variable. The student will have noticed that the majority of the common minerals are associated with this section of the great rock-classes. The following table shows at a glance some of the primary features connected with the divers kinds of igneous rocks used by the architect and engineer:—

Mineral Composition, &c., of Igneous Rocks.

I.	II.	III.	IV.	V.	VI.
Plutonic.	Granite.	Quartz, felspar, biotite, muscovite.	Schorl, hornblende, apatite, magnetite, pyrites, kaolin.	2·66	Schorlaceous granite, Hornblendic ,,
Plutonic.	Syenite.	Orthoclase, hornblende.	Plagioclase, quartz, mica, augite.	2·75–2·90	Augite-syenite. Mica ,,
Plutonic.	Gabbro.	Plagioclase, diallage.*	Olivine, augite, hornblende.	2·85–3·10	Olivine gabbro.
Volcanic.	Diabase.	Plagioclase, augite.	Magnetite, titaniferous iron, quartz.	2·80	Olivine diabase. Quartz ,,
Volcanic.	Trachyte.	Sanidine felspar, oligoclase, hornblende.	Biotite, magnetite.	2·65	—
Volcanic.	Basalt.	Augite, magnetite, titaniferous iron.	Plagioclase, olivine, nepheline, leucite, mica.	2·85–3·10	Plagioclase basalt. Mica ,,

* We have not previously alluded to this mineral, as it is not a very common rock-former. It is essentially monoclinic, with a chemical composition similar to that of augite.

I. Classification by origin or position.
II. Name of rock.
III. Essential minerals.
IV. Common accessory minerals; it is very difficult to draw the line between an essential and an accessory mineral where the former is not so abundant as might be for the class of rock in which it is contained, and where the latter is more plentiful than usual. The determination of such points as these is largely a matter of individual opinion.
V. Specific gravity.
VI. Varieties of each rock, according to the predominance of the minerals named in column IV. In such yarieties the mineral imparting a distinctive character to the rock must be regarded as an essential constituent. The elevation of an accessory to the rank of an essential mineral is frequently accomplished at the expense of one or more of the latter.

The following is the chemical composition of a typical variety of each of the rocks mentioned in the above table:—

Chemical Composition of Igneous Rocks.

Name of Rock.	Silica.	Alumina.	Oxides of Iron.	Potash.	Soda.	Lime.	Magnesia.	Titanic Acid.	Oxides of Iron and manganese	Loss, Water, &c
Granite	72·07	14·81	2·22	5·11	2·79	1·63	0·33	—	—	1·09
Syenite	59·83	16·85	7·01	6·57	2·44	4·43	2·61	—	—	1·29
Gabbro	49·00	15·00	—	0·30	2·50	9·50	9·70	—	11·50	2·50
Diabase	49·54	14·05	14·27	1·16	3·88	8·20	5·28	—	—	2·29
Trachyte	67·09	15·64	—	3·47	5·08	2·25	0·98	0·38	4·74	0·45
Basalt	44·50	16·75	—	—	2·60	9·50	2·25	—	20·12	2·00

Granite.—Many types of this rock exist in nature. They may be fine, medium, or coarse-grained; as a matter of experience it is found that the largest blocks are obtainable from the quarries yielding coarse-grained stone, though this is not universally the case. *Porphyritic granite* is a term applied to those which possess a fine or medium-grained base, and have large crystals of orthoclase felspar, sometimes as much as four inches in length, displayed in a prominent manner here and there. *Graphic granite* is distinguished by the manner in which the quartz has assumed the shape of long, imperfect columnar hollows placed parallel to each other, and enclosed within orthoclase in such a way that the markings on a transverse section of the stone look somewhat like Hebrew writing. *Schorlaceous granite* is largely found in Cornwall; the crystals of schorl are usually larger and more abundant nearer the "killas," or clay slate by which the granite is surrounded or partially overlain, than in the centre of the granitic masses. *Hornblendic granite* is commonly called syenite in some parts of the country, but as will be found on reference to the first of the above tables, the mineral composition of the rock differs from that now under discussion. Granite is largely employed for building, ornamental, and engineering purposes.

Syenite is rather a rare rock in this country, though the augite and mica varieties occur commonly in certain parts of the Continent. It is used principally for paving setts and road metal.

Gabbro occurs as large irregular masses, or in large sheets associated with volcanic rocks. The plagioclase, which is usually labradorite, is generally white or pale grey, and frequently shows signs of decomposition. When fresh, it is an exceedingly hard material, and has been used in the rough, polished, and for road-metal. Excellent gabbros are found in the United States.

Diabase is common in certain parts of Scotland, both in contemporaneous beds and in intrusive sheets and dykes. There are many varieties of the rock, founded both on mineral constitution and on structure. It is occasionally porphyritic or concretionary; and when it contains much free silica, which is rarely the case, is known as quartz diabase. Calcite frequently occurs as a secondary product in these rocks. The green antique porphyry, or *Marmor Lacedæmonium viride*, much used for pavements and general inlaid decorative work in ancient Greece and Rome, is a diabase. A similar stone is employed in Scotland as a road-metal, but the extensive outcrops of the material in Maine and New Jersey produce good stone, which is polished, or used for paving, on a large scale.

All the above-mentioned rocks, being plutonic in origin, are thoroughly crystalline in texture and very hard. They are amongst the most durable stones known, but have, nevertheless, to be carefully selected, some kinds being so much better than others.

Trachyte and *Basalt* are volcanic rocks, and though not so crystalline as the plutonic, they usually form a superior class of road-stones. As they do not often occur in large blocks, and will not take a good polish by reason of their roughness and texture, they are not used for ornamental purposes in England.

Pumice is well-known to the builder, and should here be described. It is a general term used for the solidified froth-like parts of lava, and owes its peculiar vesicular structure to the escape of steam or gases through its mass when in a molten condition. From its origin, it will be perceived that it is a product of several kinds of volcanic rocks, and its chemical composition is, therefore, extremely variable, which accounts for our not having included it in the above tables. Its percentage of silica ranges from 57 to 73; alumina, 9 to 20; and the remainder consists of lime, magnesia, potash, soda, and peroxide of iron; water is present; specific gravity 1·9 to 2·5, floats on the surface of water. Pumice-stone is largely used for cleaning down paint, &c. It is met with in all volcanic centres, and has been largely quarried at the foot of Cotopaxi, one of the volcanoes of the Andes; it there occurs in beds alternating with obsidian. The principal localities in Europe where it abounds are the Lipari Islands, and some of the islands of the Grecian Archipelago, in Iceland, and in the extinct volcanic region of the Rhine.

GENERAL BUILDING NEWS.

CATHOLIC CHURCH AT MERTHYR, GLAMORGAN.—On the 3rd inst. the Bishop of Newport and Menevia laid the primary stone of a new Catholic Church, which is now in course of erection adjacent to the Priory in Pendarren Park, Merthyr. The church, says the *Western Mail*, consists of a nave, north and south aisles, and transepts. The greater part of the crossing of the nave and the transepts will be temporary used for the chancel, whilst the north transept will be filled up for the sacristy. The style is generally of a severe Early English type, a little freer play of design being given to the west end, where the trefoil-headed doorway is already erected, with clustered columns to the jambs and moulded headway. It is flanked by lancet windows, and is to be surmounted by five lancet lights of various sizes, the wider and loftier one being in the centre. The front of the nave will be finished on each side with buttresses rising above the roof eaves, and finished by weathered gablets. The aisle roofs are lean-to. Additional entries are to lead into each transept. The roof is to be slated. Internally, there is a nave of four bays, separated from the aisles on either side by piers, alternately circular and octagonal and pointed double chamfered arches. The fifth and larger archway opens into the transepts on either hand, whilst a still larger and loftier archway is prepared for the future chancel. Lower archways are to form the connexions from each transept to the side chapels. The walls are built of local stone, the windows, piers, arches, and other dressings are of box ground Bath stone from the quarries of the Northey Stone Company. The windows are to be glazed with tinted cathedral glass. The architect is Mr. Joseph S. Harrison, of London, and the contractor Mr. T. Rees, of Merthyr Vale. The cost of the building will be about 5,000*l.*

INTERMEDIATE SCHOOL, ABERDARE.—On the 10th inst., Lord Aberdare laid the foundation-stone of a new intermediate school at Aberdare. The building is being constructed of stone, with Forest of Dean stone dressings. Accommodation is to be provided for 180 children—100 boys and 80 girls. The boys have four class-rooms, and the girls three, with a room to be devoted to instruction in practical cookery. In the centre of the building there will be an assembly-room to accommodate all the pupils of the two departments, and it will be provided with a movable screen. There are rooms for the teaching staffs, and detached from the main structure there is to be a laboratory and workshop, space being retained for a gymnasium. The architect is Mr. J. H. Phillips, of Cardiff, and Mr. David Jenkins, Swansea, is the contractor.

BANK BUILDINGS, ASHBURTON.—New premises have been erected by the Capital and Counties' Bank Company, Limited, on the site of the old "Duke's Head" Inn, Ashburton. The external walls are faced with stone obtained from Bishopsteignton, with gable copings. Dressings of doors and windows and other ornamental features are of Monk's park-stone, supplied by the Bath Stone Firms, Limited, the roofs being covered with tiles from the works of Woolliscroft & Sons, Hanley. The building contains on the ground floor bank office, occupying the entire frontage to the street, manager's room, strong room, lavatories, &c., with private entrance, hall, breakfast-room, kitchen, and other domestic offices in the rear; and on the chamber floor dining and drawing-rooms, five bedrooms, bathroom, housemaid's pantry, &c. The works have been carried out by Mr. Henry Stevens, builder, Ashburton, from the designs and under the superintendence of Messrs. J. W. Rowell & Son, of Newton Abbot.

HOME FOR INCURABLES, NEWCASTLE.—The new Home for Incurables, Moor Lodge, Newcastle, was opened a short time since. The plan of the main building is E-shaped, the vertical leg forming the main building, the middle section the dining-hall and kitchen block, and the top and bottom sections the men's and women's pavilions, the cancer pavilion being parallel to and placed at a distance of 67 ft. from the men's pavilion, but connected by a corridor, which is an extension of the corridor running through the main block. The new buildings will afford accommodation for sixty-eight inmates and the necessary staff of nurses, officials, and servants. Entrance is obtained under a moulded stone archway, surmounted by the City Arms, forming an open arch porch which admits to an entrance hall paved with Minton's tiles. There is a steam radiator in the hall to warm the air and prevent a cold draught into the main corridor, which is approached through a screen, the sashes of which are filled in with ornamental lead fret glazing by Messrs. Atkinson Brothers, of Newcastle. On the right is the matron's sitting-room, with linen store and officers' dining-room adjoining, and beyond, the women's workroom and dayroom, with the entrance for women at the east end of the main corridor. On the left of entrance hall is the committee-room

and library; the doctor's room, with dispensary and lavatory adjoining; and beyond, the men's workroom and dayroom, their entrance being on the south front, and the smoke-room. These rooms all face the south, and are connected together by the main corridor, which is 9 ft. wide and 195 ft. long. There is a similar corridor on the first floor, and both are fireproof, the floors being formed with cement concrete filled in between light steel joists and paved with diagonal pattern in red tiles and cement. The first floor of the main building over the rooms before enumerated contains bedrooms for nurses, sitting-room, matron's bedroom, bathroom and lavatory, and two dormitaries or wards, and in the rear the officers' staircase, nurses' bathroom, slop shoot, and other offices. The centre block of main building is raised to form attics for servants. There is a hospital lift for the use of infirm patients connecting the different floors. In the centre and behind the main building is the dining-hall and kitchen block; the dining-hall opens out of the main corridor near the front entrance, and is 36 ft. long, 24 ft. wide, and 12 ft. high. It is intended to use this room for concerts and amusements for the inmates, and a portable stage will be placed at one end. Adjoining the dining-hall is a serving-room, which communicates with the kitchen. The pantry, larder, and scullery have their walls finished with white glazed bricks. There is also in this block accommodation for stores. There is a mortuary in the rear of the central block, the walls of which are lined with white glazed bricks and open to the roof. The laundry and boiler-house are placed in a half basement under part of the kitchen block. There is also a wash-house lined with white glazed bricks, ironing-room and drying-stove, fitted by Messrs. T. Bradford & Co. The pavilions forming the outer sections of the letter E on the east for women and on the west for men contain in each two wards for ten beds, 38 ft. long and 24 ft. wide. There is a nurse's duty-room attached to each ward, a dressing-room heated by a steam radiator, and a bath-room. The ward offices are in an annex cut off from the wards by cross ventilated lobbies. All the staircases throughout have York stone steps and landings. The pavilion for the care of twenty cancer cases is a separate block two stories high, 92 ft. in length, and contains on each floor a day room, a separation ward for one bed, nurse's duty-room, dressing-room, and a ward for nine beds, 47 ft. long and 24 ft. wide. The ward offices are in an annexe at the end of the pavilion. The contract for the erection of the new buildings was entrusted to Messrs. Middlemiss Brothers. Mr. Robert Herron has executed the plumbers and gas-fitters' works, and the painting and glazing have been done by Messrs. Adam Robertson & Son. The ventilating arrangements have been carried out by Messrs. C. Kite & Co., of London, the steam heating and hot-water supply by Messrs. Ashwell & Nesbit, of Leicester and London, the cooking and laundry work by Messrs. Bradford & Co., of Salford, and the electric bells and lightning conductors by Mr. F. Reid, of Newcastle. The whole has been designed and executed from the plans prepared by Mr. Edward Shewbrooks, the architect to the Schools and Charities Committee, and under his personal supervision, assisted by Mr. David Reid as clerk of works.

Proposed Restoration of Mobberley Church, Cheshire.—St. Wilfred's Church, Mobberley, Knutsford, is to be restored from plans prepared by the late Mr. J. S. Crowther, the Manchester Cathedral architect. The church has already been enlarged by the erection of a chancel, and new bells have been added, and the work now to be done will embrace re-roofing and re-seating.

Extension of Aberdeen Epidemic Hospital. The accommodation at this hospital having become inadequate for the number of patients received into the institution, an addition to the buildings was regarded some time ago by the public health authorities as absolutely necessary, and tenders are now being taken in for the proposed extensions from plans by Mr. Rust, the City Architect. Some three or four acres of ground are at disposal for the additions, which are estimated to cost 12,750*l*. At present there is accommodation for ninety-six patients, and room will now be made for 130. The main features of the extension will consist of the enlargement of the two centre pavilions towards Urquhart-road (adding about a dozen nurses' bedrooms); the re-arrangement of the administration block; making a new entrance gateway and façade, and the erection of a waiting-room beside the mortuary for use at funerals, and new offices at the east side. The plans show the extension of the two centre pavilions—there are four—by building an additional wing 80 ft. by 25 ft. to the north of each, capable of containing fourteen beds, and allowing 2,000 cubic ft. of space to each bed, with bathroom and water-closet accommodation at the north end. A small private room for one bed is provided at the end of each ward, next to the entrance, the nurses' accommodation being provided in the centre between the old and the new wings. The architect has kept in view the probability, at some future time, of the present concrete pavilions being rebuilt in granite, and the plans show that this can be done without interfering with the new wings. The proposed additions will be built of granite, with ashlar masonry, and finished on the inside with hardwood flooring. In the rearrangement and enlargement of the administration block, the new accommodation consists of a room and bedroom for a resident medical officer, and a laboratory and bath-room at the back, and a large store-room beside the side entrance door, with waiting-room on the east side, and dining-room on the west side of the central entrance. The back wing of the present building is only one flat high, and it is proposed to add another floor. The main entrance from Urquhart-road will have an iron gate and granite pillars, and a lodge is also to be built.—*Scotsman*.

Wesleyan Chapel, Kiveton Park, Yorkshire.—A Wesleyan Methodist Chapel has just been built at Kiveton Park, near Sheffield. The building is in the Gothic style. The architect was Mr. J. Allsopp, Worksop. Seating accommodation is provided for 150 persons. The contractors were Messrs. G. Middleton and G. Gregg, Worksop, woodwork and joinery; and Messrs. Baines Bros., South Anston, stone and brick work.

Baptist Chapel, Belper.—On the 7th inst. the memorial stones of a new Baptist Chapel were laid at Belper. The edifice is in a central position in the town, and adjoins one of the main streets. It is designed to accommodate 500 people on the ground floor, and a gallery is to occupy three sides. The total cost, with the ground, is about 2,500*l*. Mr. A. Hingley, of Duffield, is the contractor, and the architect is Mr. S. R. Bakewell, C.E., of Belper.

New District Police Office, Glasgow.—The foundation-stone of the new Police Office in Oxford-street and Nicholson-street, Glasgow, for the southern district of Glasgow, was laid on the 1st inst. by Councillor Gray. The building will occupy an area of ground extending to 2,390 square yards; the site has cost 12,000*l*.; and the contracts for the erection of the building amount to 26,000*l*. There will be provided for the use of the police department a Court hall, Magistrates' room, muster hall, witnesses' room, and fifty-five cells to accommodate 150 prisoners. Within the new buildings there will be barrack accommodation for fifty unmarried constables. The Lighting Department has also been provided for, and there will be offices in the building for the collector of assessments and registrar for the district. The architect of the building is Mr. A. B. M'Donald, the City Engineer. Messrs. Rennie & Duncan are the contractors.

New Church, Montpelier, Bristol.—The foundation stone of the Church of St. Bartholomew, Montpelier, Bristol, was laid recently by the Mayoress of Bristol. The new edifice will be a Gothic structure of blue and red Pennant, with dressings, arches, and tracery windows of Box ground stone. The arcade arches on the north and south sides of the nave are to be of Box ground stone, supported by Forest of Dean stone-moulded columns, with moulded caps and bosses. The nave and aisle roofs will be framed together with moulded pitch-pine ribs springing from Dean Forest stone corbels; while the chancel roof is to be framed with moulded pitch-pine ribs and moulded in panels between the principals. The seats, to accommodate 750 persons, will be of pitch-pine, and set on a raised wood floor. The aisles and chancel are to be laid with tiles. Clergy and choir vestries and organ chamber are to be placed on the south side of the chancel. The building is to be warmed by hot air. It has not yet been decided to erect the tower; the lower portion only is to be at present built to form an entrance lobby. Mr. W. Bassett-Smith, of London, is the architect, Mr. George Henry Wilkins is the contractor, and the building is being constructed under the superintendence of Mr. G. Machin, clerk of the works.

Workmen's Institute, &c., Blaenavon, Monmouthshire.—On the 7th inst. the foundation stone of a new club, public hall, and other offices, Blaenavon, to be used as a workman's institute, was laid by Mr. R. W. Kennard, J.P. The premises will comprise:—on ground floor, main hall and double grand stairways, ticket offices, newspaper-room (40 ft. by 20 ft.), magazine-room, recreation-room (20 ft. by 16 ft.), committee-room, billiard-room, public lavatories, entrance to reserved seats, ladies' and gentlemen's cloak-rooms, caretaker's kitchen and living rooms, and heating apparatus. The first floor consists of a large hall capable of seating 1,107 on the hall floor and 432 on the raised gallery over the main stairs and hall. On the north side of the large hall will be a raised platform with private stairs, lady and gentleman artistes' rooms and lavatories, with approach from main-road to the platform. The whole of the external walls will be built of Newbridge (Mon.) Pennant stone, with Forest of Dean stone dressing. The architect is Mr. E. A. Lansdowne, Newport, and the contractor Mr. John Morgan, builder, Blaenavon. The estimated cost is 7,000*l*.

Wesleyan Chapel, Bagby, Yorkshire.—The foundation stones of a new Wesleyan Chapel were laid at the village of Bagby, near Thirsk, on the 9th inst. The plans, prepared by Mr. Thomas Stokes, of Thirsk, show a building in the Gothic style.

Church, Hepple, Northumberland.—The foundation stone of a new church at Hepple was laid recently by Lady Riddell. The church is a small one, to seat about 100 people, and is to be built of local stone, from designs by Mr. C. Hodgson Fowler, of Durham.

Church, near Newent, Gloucestershire.—The Bishop of Gloucester and Bristol consecrated on the 28th ult. a new church which has been built in the parish of Gorsley-cum-Clifford's Mesne, near Newent. The church is in the Early English style, and was designed by Messrs. Rollinson, of Chesterfield. It is cruciform in plan, and the east end is apsidal, the centre window being filled in with a stained-glass representation of Christ as the Good Shepherd. The other windows are filled in with tinted cathedral glass. The pulpit is of carved oak (five panels), on a Bath stone base, the work and gift of Miss Emma Onslow, of Malvern. The church is floored with wood blocks, and seated with open pitch-pine benches.

Proposed Catholic Church for Bridlington, Yorkshire.—It is intended to erect a new Catholic Church at Bridlington. The building will consist of nave 54 ft. long by 17 ft. wide, with north and south aisles 8 ft. wide. At the end of each aisle will be a side chapel; one dedicated to the Blessed Virgin and the other to the Sacred Heart. Each chapel has at the end and side a small rose window, filled with tinted cathedral glass. The roofs will be groined with pitch-pine, moulded ribs, and the floors laid with encaustic tiling. The sanctuary will be 20 ft. in length and 17 ft. in width, and will have an octagonal apse with traceried stone windows. It will be divided from the nave by a lofty arch resting on clustered shafts of Hopton wood polished stone, and capitals, with carved Early Engligh foliage, and moulded bands and bases. The arches separating the sanctuary from the side chapels are filled in with traceried oak screens. The nave will be divided on either side from the aisles by arcades of four bays, with moulded arches on octagonal shafts of Hopton wood polished stone, and moulded caps and bases. The choir gallery will be at the west end, above the main entrance, with an organ chamber at one side. The west front of the church will be built with thin red stock brick and stone dressings, the angle buttresses terminating in pinnacles of stone. A two-light traceried window, with one single-light window on either side, will fill the gable above the western entrance. The gable will be covered with moulded stone-coping, and a cross is to be fixed on the apex. There is to be a working and private sacristy and a confessional; below the sacristy a heating chamber will be formed. The accommodation provides for about 300 adults. The contract for the building is let at 1,870*l*. The design has been prepared by Messrs. Smith & Brodrick, and A. Lowther, of Hull, joint architects. Mr. John Rennard, of Bridlington Quay, is the contractor; and Mr. Fawcett, of that place, marble merchant, will supply the Hopton wood stone.

SANITARY AND ENGINEERING NEWS.

Proposed New Bridge, Glasgow.—At a meeting of the Glasgow Bridge Committee, held on the 2nd inst., it was agreed to instruct the engineer, Mr. Blyth, to prepare new plans for a bridge 80 ft. wide, instead of 100 ft. as originally proposed. This course has been adopted owing to the cost—estimated at 242,000*l*.—of the wider structure.

Sewerage Scheme, &c., Bolton.—At Bolton, on the 3rd inst., Major-General Crozier, R.E., one of the inspectors of the Local Government Board, held an inquiry into the application of the Corporation for sanction to borrow 75,000*l*., apportioned as follows:—30,000*l*. for the proposed purchase of land at Back-o'th-Bank, and the execution thereon of works in connexion with the disposal of scavenging refuse; 5,000*l*. for works of sewerage; and 40,000*l*. for purposes of electric lighting.

Extension of the North Cornwall Railway.—On the 14th inst. a section of the North Cornwall line, which now brings the railway from Launceston to within a mile of Camelford, was opened. The section really reaches to Delabole, with its slate quarries; but owing to some unexpected difficulties the last three miles of the line are not yet ready. The undertaking of the North Cornwall Railway commences at Halwill, a station on the Holsworthy line of the London and South-Western Railway. The first section is to Launceston; the second to a little village called Tresmeer; and the third section, a major portion of which is now completed, is to Delabole. The engineers of the new lines are Messrs. Galbraith & Church, their local representative being Mr. Salter, and the contractors Messrs. Currey, Reeve, & Co., who have been represented by Mr. Barrons. The portion of the line now opened, from Tresmeer to Camelford, is nine miles and twenty-six chains long. The whole length from Launceston to Camelford, which was first commenced in 1890 is just over seventeen miles, the eight miles from Launceston to Tresmeer having been opened last summer. The section of the line now constructed does not include a single viaduct or tunnel, but it runs through a series of hills and across a corresponding number of valleys, the line being entirely banks and cuttings. The chief feature is high embankments and deep and long cuttings, just out of Tresmeer. One of these banks is 86 ft. high, and spans a rather wide valley. There is an intermediate station at Otterham, about midway between Tresmeer and Camelford. The ground rises to Otterham, the gradient being 1 in 74, and near here is the highest point of the

new line—about 900 ft. above sea-level. Some two miles beyond Tresmeer the valley of the Camel is entered, and is followed without much divergence to a locality known as Melorn, where the Camelford station is situated.

FOREIGN AND COLONIAL.

FRANCE.—The railway company "de l'Ouest" has decided, it appears, to suppress entirely the long tunnel at Batignolles, an alteration which will permit of an increase in the number of lines of rail, but will also necessitate the enlargement of the bridge at Asnières. The cost of this important improvement, long demanded by the public, is estimated at from twelve to fourteen million francs.——The fine group by Girardon, "l'enlèvement de Proserpine," in the park at Versailles, is in such a state of decay that it can no longer be left in the open air. Accordingly the Department of Fine Arts has ordered that it should be transported to the Louvre, where an exact copy will be made for the park at Versailles. M. Suchetet, the sculptor, who has already, under similar circumstances, made a reproduction of the "Nymphe à la Coquille" of Coysevox, is commissioned to carry out the work.——At Roubaix the reservoir for the water of the Lys, a masonry tower 12 mètres high, surmounted by a reservoir 20 mètres high, has given way, causing much damage and injuring a number of people.——M. Roger Ballu, principal Inspector of Art Exhibitions, has officially inaugurated the Exhibition of Fine Art at Boulogne.——The death is announced of a well-known picture-dealer, M. Beugniet, who was the first, about fifty years ago, to create the picture-selling industry in the Rue Lafitte, which has since become a centre of this commerce. M. Beugniet has left to the Louvre a remarkable collection, which has been in process of formation for more than forty years, of the palettes used by the most eminent painters, and which, in the manner of disposing the colours upon them, are to a certain extent characteristic of the principle of colouring of each painter. They are all signed and accompanied by an original sketch.——M. Auguste Barthélemy Glaize, a painter whose reputation was once on the same level as that of Ingres, has died at Paris at the age of eighty-six. He was born at Montpellier, and had been a pupil of Achille and Eugène Deveria. He first exhibited at the Salon in 1836, and having first treated religious subjects, he subsequently went to literature and romance for subjects, which he often treated very happily. He also cultivated lithography and pastel with success. Among his principal works may be named "Faust et Marguerite," "Dante écrivant son Poême," "Les Femmes Gauloises," "Insultes au Christ," "L'Aveugle et le Paralytique." Glaize received medals in 1842, 1844, 1848, and 1855. He leaves a son, M. Léon Glaize, who is also well known as a painter.——There has been discovered in the choir of the Cathedral at Albi, at the foot of the altar, a tomb containing bones and a pastoral staff, which latter is of the style of the thirteenth century.——M. Falguière has just finished a statue of Gambetta, intended for the Salle des Pas Perdus at the Chamber of Deputies.——The town of Limoges is shortly to have a new monumental fountain.

SWEDEN AND NORWAY.—Arrangements are being made for the holding of a great Scandinavian Industrial Exhibition in Malmö in 1896. Efforts are being made to introduce the picturesque Swedish-timber villas in the Riviera. It is considered that they would afford far less danger than stone buildings in cases of earthquake. A company has been formed at Pegli, ten kilometres from Genoa, for the laying out of a villa town, and the company invites, through the Swedish-Norwegian Consul-general at Genoa, tenders for Swedish timber villas. Beams, flooring, and roofs are exempted from duty, but doors, window-frames, and carved woodwork pay a duty of 13 lire per 100 kilos. The carvings on the joints of the beams do not prevent duty-free import, but the duty-free materials must be imported separately, or otherwise they will be liable to duty. Further information may be obtained from the Swedish-Norwegian Consulate, Genoa, or the Director of the building company referred to, Signor Amadeo Bert, Salita dei Cappucini 23, Genoa.——The export of window-glass from Sweden to Great Britain is steadily increasing, reaching in 1892 2,536 cwts. valued at 7,125*l*., as against 1,118 cwts., and 3,384*l*. in 1891. The export of other kinds of glass rose to 115,006 cwts. and 48,031*l*. in 1892, from 112,498 cwts. and 44,855*l*. in 1891.——The Christiania Municipality has approved the central electric works constructed by Messrs. Schuckert & Co., and the cost of the same, 749,964 marks.——In the competition for the new Technical College in the town of Throndhjem, first prize was gained by Herr Ivar Cock, and second by Herr Henrik Bull, both architects, of Christiania. However, both designs require certain modifications. All the designs sent in are now being exhibited.——The town of Flekkefjord, with several thousand inhabitants, is at length to get a modern sewerage system and supply of water. Hitherto, the town had neither!

BELGIUM AND HOLLAND.—A very artistic pageant was arranged in connexion with the annual Brussels fêtes, "Agriculture" being the subject represented. The management was in the hands of the well-known painter, Gustave Den Duyts, who was supported by M. Jean Baes, the architect of the new Flemish Theatre, and the sculptor, Julien Dillens, whose works figure so conspicuously on modern examples of Belgian architecture.——The restoration of the Antwerp Cathedral is apparently being taken in hand energetically. The new woodwork on the fine old organ is alone to cost some 25,000*l*. The necessary funds have been voluntarily subscribed.——Some highly interesting excavations have been made near Bunnik, in Holland, where a Roman camp of large dimensions has apparently been found.

ELECTRIC STREET RAILWAY FOR BUDA-PESTH.—According to a recent report of the United States Consul at Buda-Pesth, the Siemens-Haiske electric street railway system, which was introduced into that city three and a-half years ago, is in operation on nearly seven miles of roads, having double lines. The electric current is transmitted from a central power station through an underground conduit, from which connexion is made to the motor of the cars. Sixty cars, each seating thirty-two passengers, are run over the lines at an average speed of twelve miles an hour. The fares charged vary from 1½d. to 2d., according to distance. The cost of construction varies from 2,070*l*. to 10,350*l*. per mile of single track, according to completeness of track and quantity of cement used. The weight of cars, including motor, is 5 tons, and their cost 1,242*l*. The cost of running each car per mile, including employés thereon, fuel, labour at power station, maintenance of track, &c., is 4⅜d. The rate of speed could easily be doubled, but the municipal regulations do not permit any increase. The service has been exceedingly satisfactory to the public, only short interruptions having been caused on a few occasions by unusually heavy falls of snow. The company working the system has obtained a concession for an extension of about three miles over some of the principal streets, and further concession will probably be secured.

MISCELLANEOUS.

THE GENERAL POST-OFFICE.—An upper floor is being built on the Post-Office (East), St. Martin's-le-Grand. It will, it seems, detract from the façade of Sir Robert Smirke's original building, which was erected in the interval 1825-9, and was opened ten years before the adoption of the penny post, of which the first despatch took place on the evening of February 2, 1839. A few years ago they robbed Smirke's building of its leading feature, the spacious central hall, entered through the portico, wherein letters used to be posted, the hall area being taken for the increasing needs of the department.

LEWES RACE COURSE.—Opportunity has been taken during the interval since the Spring Meeting of April 28-29, to make considerable changes for the comfort and convenience of visitors. A new stand, 106 ft. by 60 ft., with telegraph rooms, has been built, of red brick and flint, by Messrs. Longley & Son, of Crawley, after the designs of Messrs. Holland & Son, of Newmarket. The club and reserved enclosures in front of the stands have been raised in level by the laying down of about 3,500 tons of chalk, under the supervision of Mr. Cathcart, general manager to the proprietress, Mrs. J. F. Verrall, and a gangway has been made between the course-railings and the enclosures.

PUBLIC CLOCK, THURLSTONE, NEAR PENISTONE, YORKSHIRE.—A new illuminated public clock, showing the time upon one external dial, 4 ft. 6 in. in diameter, has been erected in the new Water Tower of Messrs. Thomas Tomasson & Sons' manufactory at Thurlstone, by Messrs. Wm. Potts & Sons, clock manufacturers, of Leeds. Mr. Stocks, of Huddersfield, is the architect of the building.

THE AMERICAN PRODUCTION OF PIG-IRON IN 1893.—According to the statistics of the American Iron and Steel Association, the output of pig-iron of the United States in the first six months of this year was 4,562,918 tons, against 4,387,317 tons in the second half of 1892, and 4,769,683 tons in the first half of last year. There was thus an increase of 175,601 tons, or 4 per cent., compared with the second half of 1892, but a decrease of 206,765 tons, or 4·3 per cent., compared with the first half of that year. The production of Bessemer pig-iron in the past six months was 2,374,890 tons, against 2,189,696 tons in the second half, and 2,254,345 tons in the first half, of 1892, which shows an increase of 185,194 tons, or 8·4 per cent., and of 120,545 tons, or 5·3 per cent., when compared with the two latter periods. The American iron trade being at present in a worse condition than it has ever been before, there is every indication that the out-put of pig-iron in the second half of this year will fall below that of the corresponding period of last year, and that the production of the current year will be much less than that of 1892. Notwithstanding that the number of furnaces in blast on June 30 last was only 225, against 253 on December 31, 1892, the output has been larger, and it is highly probable that their number will be reduced, especially as stocks of pig-iron are now larger than at the close of 1892.

RICHMOND HILL.—Strong public opposition, by no means confined to Richmond and its locality, has been raised to certain proposals recently submitted to the Richmond Town Council by the Dysart Trustees, having for their object the development of their extensive estates at Petersham and Ham. The proposals, which are now under the consideration of the Richmond Town Council, whose co-operation the trustees are seeking, are the outcome of an endeavour to secure a site for an isolation hospital for the boroughs of Richmond and Kingston, and the lease of Petersham meadows, to prevent their being built over. The trustees propose to hand over to the borough in perpetuity a considerable part of the meadows, and also to vest in the Town Council the rights of lords of the manor over Petersham common, except that part known as Petersham Wood, upon which it is proposed, by a suggested Act of Parliament, to extinguish the commonable rights so as to leave the trustees free to sell or let the land for building purposes. The scheme also embraces the making of a roadway on the bank of the river by the side of the Petersham meadows as far as Ham House, and it is likewise proposed that the Act shall enable the Trustees to close most of the footways in the neighbourhood of Ham House. The proposal to erect houses on the bit of woodland on the south side of the Star and Garter Hotel is strongly opposed, and it has been intimated to the trustees that any attempt to extinguish commonable rights or to close existing footpaths will be resisted to the utmost. There seems to be a diversity of opinion as to the extent to which building operations would affect the view from Richmond Hill and the park, though it is generally believed that the effect would be more or less damaging. The Richmond Town Council have rejected the scheme in its present form, though the correspondence and the whole subject have been referred to the Highway Committee for further consideration.—*Morning Post.*

CRYSTAL PALACE SCHOOL OF ENGINEERING.—On the 12th inst. the students belonging to the School of Practical Engineering at the Crystal Palace, received the certificates gained by them at the examination which took place at the end of the summer term. The chair was occupied, in the absence of Sir E. Carbutt through indisposition, by Mr. G. B. Roche, M.Inst.C.E., Chief Engineer of the London Chatham and Dover Railway. Prior to the distribution of the awards by the Chairman, Mr. R. G. Hodson (Superintendent of the Crystal Palace School of Art, Science, and Literature), stated that forty-seven students had attended the lectures on mechanical engineering, and of the forty-four who underwent the lecture examination on "Railways, their construction and appliances," thirty-one passed. The reports of Mr. J. F. Harrison with reference to the three mechanical branches of the school, that of Mr. W. Lawford on civil engineering, and the report of Mr. J. G. W. Aldridge as to the electrical section, all bore high testimony to the practical progress of the students, and referred in congratulatory terms to the success of the Principal, Mr. J. W. Wilson, and his staff of assistants. On the motion of Mr. E. Green, a vote of thanks was subsequently accorded to the examiners.

NEW BRICKWORKS AT NEWPORT, MONMOUTHSHIRE.—The opening of the new brickworks—or, rather, the extension to the old works—at St. Julian's, Newport, took place, says the *Western Mail*, on the 5th inst. The decision to extend the works was arrived at some two or three years ago, when a limited liability company was formed, with Messrs. C. H. Firbank (chairman), C. D. Phillips, and Thomas Parry as directors. The works are situated upon a piece of land 24½ acres in extent on the east side of the Usk. There is a plentiful supply of clay. The machinery and kilns are of the latest description, and the total weekly output of bricks, it is estimated, will not be less than 150,000.

REFUSE DESTRUCTOR, GOVAN, N.B.—On the 10th inst. the new refuse destructor, which has been erected in Helen-street by the Police Commissioners of Govan, was opened by Provost Kirkwood. The building, which is situated at the head of Helen-street, is two stories high and built of brick. The whole construction covers about five and half acres of ground, and the total cost is nearly 10,000*l*., half of which sum was given for the ground. The refuse collected from the burgh is conveyed to the upper floor and tipped into the cells; it is then drawn on to the furnace bars, where it is consumed. There are six cells, each measuring 12 ft. in length, 5 ft. in breadth, and 3 ft. in depth, and two others are in course of construction. Provision has also been made for the erection of another destructor. The furnaces are charged from the back, and the gases which arise from the burning and green refuse are made to pass over the hottest part of the fire, and are thus destroyed. Warner valves or dampers are also provided, by which the escape of dust, papers, &c., is avoided. Each cell destroys three tons of refuse per day, but, owing to the incombustible nature of the refuse, they are not worked to the full capacity, each cell being capable of destroying about five tons. The temperature in the main flue is about 1,500 deg. Fahr. The system was devised by Messrs. Goddard, Massey, & Warner, of Nottingham.

WALTON PARK ESTATE, BRISTOL.—We are informed that Messrs. Richard J. Collier & Henderson have recently sold the remaining portion of the Walton Park Estate, near Bristol, for a sum approaching 9,000*l*.

COMPETITIONS, CONTRACTS, AND PUBLIC APPOINTMENTS.

COMPETITIONS.

Nature of Work.	By whom Advertised.	Premiums.	Designs to be delivered.
*Enlargement of Asylum	North Wales Counties Lunatic Asylum	50*l.* &c.	Dec. 2
Grammar School, Uldale, Carlisle	Rev. J. Greenwood	.....	No date

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.
Chapel and Schoolroom, Clown, Worksop	Trustees of the United Methodist Free Church	J. Allsopp	Aug. 22
Stables, Coachhouse, &c. Hollyroyd, Dewsbury	.....	F. W. Ridgway	do.
Alterations to School Buildings, Durham	Penshaw and Offerton (U.D.) Sch. Bd.	J. Gibson Cowe	do
Paving Materials	Bootle Corporation	J. A. Crowther	do.
Public Hall, Cummertrees, N.B.	Rev. A. Sinclair Nichol	.....	do.
Union Hall, Workshops, &c.	Dover Town Council	*Official*	do.
Mechanics' Institute, Barrington Colliery	Bedlington Coal Co. Lim.	do.	do.
Re-building Almshouses, Exeter-street, Salisbury	.....	J. Harding & Son	Aug. 23
*Road Works	Southend-on-Sea Corp.	C. T. Copley	Aug. 24
School Buildings, near Rochester	Halling School Board	H. Bensted	do.
*Artisans' Dwellings	Salford Corporation	W. R. Sharp	do.
Gasholder Tank, Grange-road	Dunfermline Gas Co. Lim.	T. Newbigging	do
Warehouse, Chapel-street, Bradford, Yorks	.....	Milnes & France	do
Chimney Shaft, &c.	Chesterton Union	*Official*	do.
Timber Bridge at Cemetery	King's Lynn Corp.	E. J. Silcock	Aug. 25
Additions to School Buildings, Hebden Bridge	.....	Jno. Sutcliffe	Aug. 26
Presbytery, St. Patrick's Chapel, Leeds	.....	J. Kelly	do.
*Clearing Sand from Frogmore Lake	H.M. Works	*Official*	do.
*Sea Wall and Esplanade	Cromer Protection Com	J. C. Mellias	Aug. 29
Piling Works (Contract No. 1), Altham	Burnley Corp.	F. S. Button	do.
*Main Road Improvement and Maintenance	Edmonton Loc. Bd.	G. E. Eachus	do.
*Sewerage Works	Burton-on-Trent Corp.	*Official*	do.
*Building Materials	Borough of Croydon	do.	Aug. 30
Retort House, Gasworks, Deane-street	Rochdale Corporation	do.	do.
Bridge Work, Rothbury	Northumberland C. C.	do.	do.
*School Buildings	Eynsford School Board	G. St. Pierre Harris	do.
Street-making, Beal-lane, &c. Shaw, Lancs.	J. H. Lees-Milne, J.P.	J. Rawlinson	do.
School Buildings, Gravesend	Rev. W. Joynes	Cobham & Cobham	do.

CONTRACTS—*Continued.*

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.
School Buildings, Pontypool	Trevethin School Bd.	E. A. Lansdowne	Aug. 31
Forty-eight Cottages, near Cwm, Wales	Graig Fawr House and Land Co. Lim.	*Official*	do.
Paving Tweed and other Streets	Sunderland Corp.	do.	Sept. 1
Additions to Schools, Pontnewydd, Newport, Mon.	The Vicar	.....	Sept. 2
*Stoneware Pipes	Romford Local Board	*Official*	do.
Additions, &c. to School, Tredegar	Bedwellty Sch. Bd.	James & Morgan	Sept. 4
*Painting, &c. Girls' School, Sutton	South Metro. School District	*Official*	do.
*Fencing at New Cemetery	Richmond (Surrey) Town Council	E. J. Lovegrove	do.
*Road Materials	Maidstone U.R.S.A.	*Official*	Sept. 5
Twelve Cottages, Gloucester-road, Barnstaple	H. Ballinger	W. C. Oliver	do.
*Additions to School of Science and Art	Bromley Local Board	Potts, Son, & Hennings	do.
Quay Works, Newhaven	Harbour and Dock Com.	P. Whyte	Sept. 6
Sewers and Outfall Works, nr. Birmingham	King's Norton R.S.A.	R. Godfrey	Sept. 9
School Buildings, Totton	Elling School Board	Mitchell, Son, & Gutteridge	do.
*Sewerage Works	Ware U.R.S.A.	Bailey-Denton, Son, & North	do.
*Two New Wards	Derby County Lunatic Asylum	J. S. Story	Sept. 13
Extension of Bridges, Amble	N.E.Ry. Co.	*Official*	do.
Re-building Providence Chapel, Rochdale	.....	Smith & Cross	No date
Re-building Business Premises, Backworth	Abbey Impd. Chilled Shot Co.	.....	do.
Newcastle-on-Tyne	Committee	.....	do
Synagogue, North Church-street, Sheffield	do.	J. Ferguson	do.
Church, Duncairn-gardens, Belfast	Old Baptist Union	*Official*	do.
*Chapel, Stoke Newington	Wilts and Dorset Banking Co.	G. M. Silley	do.
*Banking Premises, Gloucester	War Department	*Official*	do.
*Painting Works, Chester			

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.
*Building Inspector	Burton-on-Trent Corp.	120*l.*	Aug. 28
*Surveyor's Assistant	Bromley Local Board	100*l.*	Aug. 26
*Building Inspector	Norwich Corporation	150*l.*	do.
*Assistant Surveyor of Buildings	Civil Service Com.	.....	Aug. 30
*Clerk of Works	Whitstable, &c. School Board	2*l.* 10*s.* per week	No date

Those marked with an Asterisk (*) are advertised in this number. *Competitions, p.* iv. *Contracts pp.* iv., vi., *and* viii. *Public Appointments, p.* xviii.

Subsidence at Kelvin Bridge, Glasgow.—The *Glasgow Herald* states that the subsidence at Kelvin Bridge is extending in a somewhat alarming manner. When the original fracture in the bridge took place it was entirely to the northward, and only affected the north parapet. A new development, however, has taken place. There has been a marked subsidence to the westward, affecting the south parapet. The masonry is showing signs of severing, and the cavity in the pavement and street is increasing. Notwithstanding the measures which have been taken to prop up the building at the south-west corner of the bridge, the subsidence is also extending there. Additional cracks are discernible, and the plate-glass windows show signs of displacement. The boring operations which have been proceeding for some time have reached a considerable distance below the foundation of the bridge. The solid rock has been reached after encountering alternate seams of coal and stone. Mr. White, master of works, visited the scene of the subsidence a few days ago, and after a minute examination of the bridge and surroundings he stated that there is no immediate danger of a collapse, nor did he anticipate stoppage of the traffic. The cavity in the street, however, will necessitate the lifting of the car rails and levelling up of the causeway. These operations will be conducted during the night.

LEGAL.

DECISION UNDER THE METROPOLIS MANAGEMENT ACT, 1862, AND THE LONDON COUNCIL GENERAL POWERS ACT, 1890.

At the West London Police Court on the 11th inst., Mr. Haden Corser gave his decision in the case of the London County Council *v.* George Nixey, builder, of Broxholme-road, Fulham.

Mr. Chilvers, from the Solicitor's Department, appeared for the Council, and stated that Mr. Nixey had erected a building on the south-eastern side of Gowan Avenue, Fulham, at the corner of Munster-road, in advance of the general line of buildings in Gowan Avenue. The defendant appealed from the architect's certificate, and the Appeal Tribunal appointed under the London Council General Powers Act, 1890, sec. 28, had heard the appeal, and confirmed the line laid down by the architect, but found as a fact that the site on which the building was erected had been laid out for building before the passing of the Act of 1890.

Mr. Moyses, barrister, who appeared for the defendant, contended that the building was in Munster-road, that being the road on which it fronted, and that the architect had no power to decide as to which street the building was in, that being a question entirely for the magistrate. He also contended that the Appeal Tribunal having found, as a fact, that the site was laid out for building before 1890, the defendant's land came within the exemption contained in section 33 of the General Powers Act, 1890, and that the Council could not, therefore, obtain the order asked for.

The magistrate, in giving his decision, said he had looked at the cases which had been referred to by both sides, viz., Spackman *v.* Plumstead District Board, Barlow *v.* Kensington Vestry, and the London County Council *v.* Cross, and it appeared to him from those decisions it was for the Superintending Architect to decide not only the general line of buildings but also in which street the building was situate, and with regard to section 33, he stated he failed to see how that applied to the present case, as that section only applied when the architect was laying out the general line of buildings in the front and side street at the same time, but in the present case he had only decided the line in one street, and under the provisions of sec. 75 of 25 and 26 Vic., cap. 102, and not under section 33, the Act of 1890, which did not take away any powers from the previous Act, and he must therefore make an order for the demolition of so much of the building as had been erected in advance of the general line of buildings. There was also a similar summons against Mr. Courtenay for erecting a building on the opposite side of Gowan-avenue. But this was adjourned *sine die*, as the magistrate consented to state a special case for the opinion of the High Court in Nixey's case.

MEETINGS.

Monday, August 21.

Cambrian Archæological Association.—Annual Meeting, Oswestry, Shropshire.

Tuesday, August 22.

Cambrian Archæological Association.—Annual Meeting, Oswestry (continued).

Glasgow Architectural Association.—Visit to Hutchesontown Free Church. 6 p.m.

Wednesday, August 23.

Cambrian Archæological Association.—Annual Meeting, Oswestry (continued).

Thursday, August 24.

Cambrian Archæological Association.—Annual Meeting, Oswestry (continued).

Friday, August 25.

Cambrian Archæological Association.—Annual Meeting, Oswestry (continued).

Saturday, August 26.

Liverpool Engineering Society.—Visit to the Mersey Aqueduct Tunnel and Norton Water Tower, by permission of the water engineer, Mr. Joseph Parry.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

11,070.—Closets: *A. J. Boult* (communicated).—This improvement relates to the class of closet in which the rim or flange of the lid enters a groove filled with water—water sealed. The lid is first lifted to some extent, and then turned sideways. The object of the invention is to provide mechanism for moving the lid automatically and in conjunction with the top cap or cover. For this purpose the pan lid, the flanges of which rest in the water grooves or channels for making the seal, is so connected mechanically with the flaps of the closet that the raising or lowering of the same actuates also the lid of the pan.

14,462.—Closet or Bath Tops, Seats, or Rims: *H. Sutcliffe.*—This invention is designed to obviate the danger of injury to delicate persons from bodily contact with cold closet or bath seats, rims, or tops of the usual character. In order to effect this the inventor makes the upper surface of the seat, rim, or top, of ground or powdered cork, or a mixture of cork with other material which will not neutralise the warmth of the cork.

15,264.—Spokeshaves: *R. Stevens.*—This invention relates to spokeshaves for working wood, and is designed to preserve the stock, maintain a uniform pitch of blade, and to prevent the latter flying out when in contact with a knot or the like. The metallic blade is provided at each end with a screwed stem, which passes through the stock, being secured thereto by winged or other nuts. The front side of the stock is provided with holes or openings, in which are disposed buffers of india-rubber or other pliable material, through which the screwed stems pass.

15,934.—Decorating Tiles, Bricks, Pottery, and Porcelain: *John Bilton.*—According to this invention the ornament is first cut as a stencil on a sheet of thin metal. This plate is then placed on a sheet of paper, or other suitable material, and liquid clay rubbed through it so as to adhere. By applying this paper, with pattern, to the unfixed tile, &c., the design is transferred from the paper to the surface of the former.

20,059.—Sliding and Swinging Window-sashes and Frames: *H. J. Ford.*—This invention relates to that class of window-sashes which, while usually intended to slide in their frames, are also so fitted that they may be swung about one of their side edges when desired, for instance, for cleaning or moving large articles in or out. This object is effected by providing the sashes on one side with hinges of improved type, and making sundry modifications in the inside face linings, &c.

NEW APPLICATIONS FOR LETTERS PATENT.

July 31.—14,659, J. Sheldon, Fasteners for Window-sashes, French Windows, Shutters, &c.—14,663, V. Cotton, Portable Carving Bench.

August 1.—14,715, E. Harcourt, Bell Pull Arrangement for Electric Bells.—14,718, J. Judd, Expanding and Contracting Door, Window, Shop-Front Guards, &c.—14,738, J. Flannery and S. Terry, Ventilation of Enclosed Spaces.—14,742, F. Plumstead and H. Hunter, Electric-Light Fittings.—14,760, W. and E. Freeman, Soil-pipes and Ventilating Shafts.

August 2.—14,777, T. Whitehead, Construction of Outlet Ventilators for Buildings.—14,820, W. Eckstein and J. Willmore, Manger Fittings for Stables

AUGUST 3.—14,882, K. Cornish and J. Cassavetti, Glazed Earthenware, and Metallic Facings to Bricks, Tiles, and Concreted Surfaces.

AUGUST 4.—14,932, C. Martin, Divided Chimneys.—14,994, J. Mathisen, Door-locks or Latches.

AUGUST 5.—15,008, H. Stanton, Fire-resisting Floors.—15,027, C. and A. Musker, Folding Gates and Shutters.—15,076, L. Gill, Construction and Erection of Girder-bridges.

PROVISIONAL SPECIFICATIONS ACCEPTED.

11,538, S. Adams, Dovetail Key in Bricks.—11,638, G. Oncken, Veneers.—12,519, G. Mecenero, Sanitary Ventilation.—12,915, G. Ewart and others, Metal Roofing.—13,103, A. Sanderson, Lowering and Raising and Fastening Window-sashes, or any like Sliding Casements.—14,192, W. Cooper, Ventilators.

COMPLETE SPECIFICATIONS ACCEPTED.

(Open to Opposition for Two Months.)

13,947, C. Openshaw and R. Wood, Ventilating Brick for Building in Brick or other Walls to Carry Joists or other Wall Timbers to Prevent Rot.—19,683, F. Poole, Squares.—6,380, J. Brider, Window-frames and Sashes.—12,052, Z. Leglay, Springs for Doors, Windows, &c.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

AUGUST 8.—By *Fowler & Son:* A plot of f. land, King's-rd., Richmond Hill, about 1¼ acre, 1,850*l.*—By *J. Hibbard & Sons:* 9, Baxter-rd., Islington, u.t. 66 yrs., g.r. 5*l.* 5s., 275*l.*—By *E. & H. Lumley:* The Perpetual Advowson of Tonge, Sittingbourne, 300*l.*

AUGUST 9. — By *A. Barton:* 39, Townshend-rd., Regent's-pk., u.t. 26 yrs., g.r. 10*l.* 10s., 270*l.*—By *Egerton, Breach, Galsworthy, & Co.:* 1, Devonshire-st., Islington, f., r. 67*l.* 10s., 1,120*l.*; 1, Oxford-ter., f., r. 48*l.*, 650*l.*—By *Ellis & Son:* L. Wharfage, Creek-rd., Deptford, u.t. 25 yrs., g.r. 37*l.* 10s., r. 135*l.*, 1,000*l.*—By *W. W. Read & Co.:* Six named houses, Ringstead and Carshalton-rds., Sutton, f., r. 322*l.*, 4,220*l.*

AUGUST 10.—By *W. A. Blakemore:* The residence "Rothsay," Stembridge-rd., Anerley, f., 310*l.*; 31, 33, Dimsdale-rd., Fulham, f., 500*l.*; 1, Goodson-rd., f., 200*l.*; 41, Crichton-st., Wandsworth, u.t. 71 yrs., g.r. 3*l.* 10s., 140*l.* — By *Fleuret, Son, & Adams:* 61, Essex-rd., Islington, f., r. 75*l.*, 1,360*l.*; 6, 8, Church Lane, f., r. 104*l.*, 750*l.*—By *Newbon & Co.:* 2, Hilldrop-rd., Camden-rd., u.t. 54 yrs., g.r. 8*l.* 8s., 760*l.*; 107, Sandringham-rd., Dalston, u.t. 67 yrs., g.r. 6*l.* 10s., 375*l.*; 52, 53, 54, Popham-rd., Islington, u.t. 15 yrs., g.r. 15*l.*, r. 90*l.*, 150*l.*; 41, Linton-st., u.t. 34 yrs., g.r. 4*l.* 4s., r. 35*l.*, 310*l.*; 12, 13, Willingham-ter., Kentish Town, u.t. 74 yrs., g.r. 9*l.*, r. 56*l.*, 400*l.*; 34, Ponsonby-pl., Vauxhall, u.t. 34 yrs., g.r. 6*l.* 6s., r. 38*l.*, 390*l.*; 41, 45, 47, Ambler-rd., Finsbury-pk., u.t. 74 yrs., g.r. 14*l.* 5s., r. 90*l.*, 830*l.*—By *Stimson & Sons:* 57, 59, 61, Brailford-rd., Brixton, u.t. 82 yrs., g.r. 25*l.* 10s., 900*l.*; 17, 18, 19, Ada-pl., and 9, Marian-sq., Hackney, u.t. 56 yrs., g.r. 8*l.*, 405*l.*; three plots of f. land, Prospect-rd., Woodford, 75*l.*; "Briar Bank," Etherow-st., Dulwich, f., r. 35*l.*, 540*l.*; 37, Raul-rd., Peckham, u.t. 78 yrs., g.r. 6*l.* 10s., r. 35*l.*, 300*l.*—By *J. W. Truman:* 9 to 18, High-st., Wimbledon, u.t. 29 yrs., g.r. 25*l.*, r. 385*l.*, 4,370*l.*—By *Wilkinson, Son, & Welch* (at Brighton): 16, Powis-rd., Brighton, f., r. 60, 900*l.*; 48, Hove Villas, f., r. 57*l.*, 900*l.*

AUGUST 11.—By *Walker & Rüntz:* 27, 28, Charlotte-st., Great Eastern-st., u.t. 305 yrs., g.r. 25*l.*, 1,200*l.*—By *C. & H. White:* No. 193, Kennington-rd., u.t. 78 yrs., g.r. 17*l.*, r. 48*l.*, 300*l.*; 13, Paulton-st., Chelsea, u.t. 58 yrs., g.r. 6*l.*, 370*l.*; No. 102, Lambeth Walk, f., r. 46*l.*, 550*l.*

[*Contractions used in these Lists.*—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; e.r. for estimated rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; yd. for yard, &c.]

PRICES CURRENT OF MATERIALS.

TIMBER.		
Greenheart, B.G. ton	9/0/0	0/0/0
Teak, E.I. ..load	9/0/0	15/0/0
Sequoia, U.S.ft.cu.	2/3	2/6
Ash, Canada load	2/10/0	3/15/0
Birch, do.	2/10/0	3/0/0
Elm, do.	3/5/0	4/10/0
Fir, Dantsic, &c.	1/5/0	2/15/0
Oak, do.	2/15/0	5/5/0
Canada	5/10/0	7/0/0
Pine, Canada red	2/10/0	3/0/0
Do. Yellow	3/0/0	4/15/0
Lath, D'ntsic, fath	4/10/0	5/10/0
St. Petersburg..	5/0/0	6/10/0
Wainscot, Riga, &c., log	2/15/0	5/0/0
Odessa, crown	2/15/0	5/0/0
Deals, Finland 2nd & 1st std 100	6/10/0	9/10/0
Do. 4th & 3rd ..	6/10/0	7/0/0
Do. Riga	7/0/0	8/10/0
St. Petersburg, 1st yellow	9/0/0	13/0/0
Do. 2nd yellow..	7/0/0	8/0/0
Do. white	8/0/0	10/0/0
Swedish	7/0/0	15/0/0
White Sea	7/0/0	15/10/0
Canada, Pine 1st	21/0/0	28/10/0
Do. do. 2nd	16/0/0	17/10/0
Do. do. 3rd &c.	7/10/0	10/5/0
Do. Spruce, 1st	8/10/0	11/0/0
Do. do. 3rd & 2nd	6/10/0	8/0/0
New Brunswick	6/0/0	7/10/0
Battens, all kinds	3/0/0	15/0/0
Flooring boards, sq., 1 in. prep, 1st	0/9/6	0/14/6
Do. 2nd	0/7/6	0/11/6
Other qualities—	0/4/6	0/7/0
Cedar, Cuba ..ft.	/4	/4½
Honduras, ..&c	/4	/4½
Mahogany, Cuba	/4	/6½
St. Domingo, cargo av.	/3	/6
Mexican do. do.	/3½	/4½
Tobasco do. do.	/3½	/6
Honduras do. ..	/4	/5½
Box, Turkey ton	4/0/0	13/0/0
Rose, Rio	9/0/0	20/0/0
Bahia	8/0/0	18/0/0
Satin, St. Domingo ..ft.	0/0/6	0/1/2

TIMBER (*continued*).		
Satin, Porto Rico	0/0/7	0/1/6
Walnut, Italian ..	0/0/3½	0/0/7
METALS.		
Iron—Pig, in Scotland ..ton	2 1/9½	0 0 0
Bar, Welsh, in London	5/17/6	6/0/0
Do. do. at works in Wales	5/7/6	5/10/0
Do. Staffordshire, in London	6/0/0	6/10/0
COPPER—British, cake and ingot	44/15/0	45/5/0
Best selected	45/15/0	46/5/0
Sheets, strong..	54/0/0	0/0/0
Chili, bars	41/2/6	41/10/0
YELLOWMETAL lb	0/0/4½	0/0/5
LEAD—Pig, Spanish ..ton	10 0/0	10/1/3
English com. brands	10/2/6	10/3/9
Sheet, English, 6 lbs. per sq. ft. and upwards	12/0/0	0/0/0
Pipe	12/10/0	0/0/0
ZINC—English sheet ..ton	21/15/0	0/0/0
Vieille Montagne	22/5/0	0/0/0
TIN—Straits	79/10/0	80/0/0
Australian	81/5/0	81/15/0
English Ingots..	86/10/0	87/0/0
Banca	89/0/0	89/10/0
Billiton	85/0/0	85/10/0
OILS.		
Linseed ..ton	21/0/0	21/5/0
Cocoanut, Cochin	29/0/0	0/0/0
Do. Ceylon	26/15/0	27/0/0
Palm, Lagos	26/0/0	0/0/0
Rapeseed, English pale	24/0/0	0/0/0
Do. brown	22/5/0	22/10/0
Cottonseed ref.	21/0/0	21/2/6
Oleine	22/0/0	23/10/0
Lubricating, U.S.	4/0/0	5/0/0
Do. refined	5/10/0	12/0/0
TAR—Stockholm barrel	0/18/6	0/0/0
Archangel	0/12/6	0 0/0

TENDERS.

[Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than* 10 *a.m. on Thursdays.*]

ALDERSHOT.—For works of sewerage, Brighton-road; also surface drainage, for the Local Board. Mr. Banks Rushford, Surveyor, Victoria-road, Aldershot:—

Brighton Road Sewer.

S. Kavanagh	£207 16 0	D. H. Porter, 90, Chatsworth-road, Clapton, N.E.*	£125 3 4
J. Neave	183 0 0		
W. J. Snuggs	157 16 10		
Geo. Kemp	132 1 0		

* Accepted.

Surface Water Drainage.

J. Neave	£1,088	D. H. Porter, Clapton*	£820
G. Kemp	859	W. J. Snuggs (withdrawn)	555

* Accepted.

ALNWICK.—For the erection of residence in Green Batt, Alnwick, for Mr. S. G. Patten. Mr. George Reavell, junr., architect, Alnwick:—

Mason.—J. Whinham	£282 0 0
Joiner.—C. Nettleship	198 0 0
Plumbers.—Wilkin & Dickman	67 15 0
Slaters.—J. Purdie	25 0 0
Plasterer.—W. Dixon	65 2 0
Painters and Glaziers.—A. Robertson & Son	15 18 6

[All of Alnwick.]

BOURNEMOUTH.—For alterations and additions to No. 5, Adelaide-terrace, Old Christchurch-road, Bournemouth, for the London and Midland Banking Company, Limited. Messrs. Lawson & Donkin, architects and surveyors, Yelverton Chambers, Bournemouth. Quantities supplied:—

Wm. Hoare	£2,100 0	T. H. Kingerlee	£1,690 0
Entwisle & Cox	1,795 0	Jenkins & Sons	1,669 0
Shears & Son	1,792 10	W. J. Chinchen	1,650 0
Mc William & Son	1,770 0	W. H. C. Curtis, Poole and Bournemouth*	1,640 0
George & Harding	1,700 0		

* Accepted.

BURY.—For the erection of twenty-two houses, Whaley Bridge, for the Radcliffe Printing Company, Limited. Mr. Jas. Sellers, architect, Union Chambers, Bury, Lancs.:—

Draining, Brick, and Stonework.—Mr. David Drinkwater, Bridgemont, Whaley Bridge.
Carpenter and Joiner.—Messrs. J & W. Bellhouse, Eagle Quay, Manchester.
Plumbing, &c.—Mr. John Kershaw, Market-street, Heywood.
Slaters.—Warr & Co., Bolton.
On schedule of prices.

CANNOCK (Staffordshire).—For laying on hot and cold water supply at the Union Workhouse. Messrs J. R. Veal & Son, architects, Wolverhampton:—

	Builders' Work.	Galvanised Iron Piping.	For Lead Pipes, &c.
H. Gough	£59 11 0	£249 8 0	£21 10 0
W. Birch	—	214 0 0	60 0 0
Rudge & Griffiths	—	212 0 0	—
S. Jellyman	—	210 12 0	10 10 0
C. C. Parkes	—	210 0 0	—
J. Attwood	—	207 0 0	—
J. E. Stokes, Cannock	—	207 0 0*	18 0 0*
J. Reynolds	48 0 0*	—	—

* Accepted.

CARDIFF.—For providing and fixing four automatic flushing tanks at the City of Llandaff, for the Cardiff Rural Sanitary Authority. Mr. W. Fraser, Engineer and Surveyor to the Authority:—

Thos. Rees	£160 0 0	Williams & Thomas	£107 0 0
Batchelor & Snowdon	140 0 0	Geo. Smallridge	99 7 4½
Frank Ashley	131 13 8	Ellis and Davies	99 0 0
Wood & Son	111 12 0	A. Knight, Cardiff*	97 10 0
Wm. Cox	109 10 0	T. J. Davies	95 0 0
		W. Jenkins	88 9 8

* Accepted.

CARDIFF.—For providing and fixing six automatic flushing tanks at Llandaff-yard, for the Cardiff Rural Sanitary Authority. Mr. W. Fraser, Engineer and Surveyor:—

Thos. Rees	£240 0 0	Geo. Smallridge	£137 13 7½
Batchelor & Snowdon	200 0 0	Williams & Thomas	134 10 0
Frank Ashley	190 7 6	Jas. Allan	132 7 10
Wood & Son	170 12 0	T. J. Davies	130 0 0
W. Jenkins	159 11 6	W. Cox	129 10 0
Ellis & Davies	144 0 0	A. Knight, Cardiff*	129 6 3

* Accepted.

CARDIFF.—For draining villa residences in Ely-road, Llandaff, for the Cardiff Rural Sanitary Authority. Mr. W. Fraser, Engineer and Surveyor:—

Ellis & Davies	£110 8 0	A. Knight	£80 11 6
Batchelor & Snowdon	104 17 10	Williams & Thomas	79 15 0
W. Jenkins	96 10 0	Jas. Allan	78 18 0
T. J. Davies	88 9 6	John Mackay	75 12 0
Frank Ashley	88 3 6	Wood & Son, Cardiff*	70 10 0
Thos. Rees	81 15 0		

* Accepted.

CARDIFF.—For making sewers for the drainage of Ely village to the main sewer from Cardiff, for the Union Rural Sanitary Authority. Mr. W. Fraser, Surveyor, 14, Radnor-road, Canton, Cardiff. Quantities by surveyor:—

Baker & Gregory	£1,250 15 0	Ellis & Davies	£810 9 6
W. Cox	1,250 15 0	John Mackay	786 10 0
D. Jenkins	1,063 6 0	W. Wood & Son	776 19 6
Batchelor & Snowdon	1,022 16 6	Frank Ashley, Cardiff*	756 9 2
Thos. Rees	941 0 0	T. J. Davies	754 0 0
W. Jenkins	924 18 0		

* Accepted.

CARDIFF.—For additions to the free library, &c., for the Corporation. Messrs. Seward & Thomas, architects, Queen's Chambers, Queen-street, Cardiff:—

Stephens, Bastow, & Co.	£15,999 0 0	E. C. Newby & Co.	£15,091 16 9
W. Symonds & Co.	15,971 16 10	G. Rutter	14,836 5 3
Shepton & Son	15,748 7 6	E. Turner & Sons, Cardiff*	14,542 0 0
Lattey & Co.	15,350 0 0		

* Accepted.

CROYDON.—For block of five cottages and pair of semi-detached cottages, Alma-place, Thornton Heath. Mr. Alfred Broad, architect, 27, Dingwall-road. Quantities by the architect:—

J. Smith & Sons	£1,753	E. J. Saunders	£1,644
G. E. Bryan & Son	1,726	J. Dewdney	1,599
E. P. Bulled & Co.	1,697	Handscomb & Smith	1,569
W. Marriage	1,665	D. W. Barker	1,475
M. Taylor	1,652	W. Smith, Croydon*	1,432
Batley & Linfoot	1,650		

* Accepted.

DONNINGTON (Berks).—For a residence for Mr. John Shaw, Normanton House, Derby, at Donnington, near Newbury, Berks. Mr. Jas. H. Money, architect, Newbury. No quantities supplied:—

	Builders' Work.	Plumbers' Work.
Pope & Co.	£1,890 0	£178 0
Geo. Elms	1,714 19	195 19
A. H. Houghton, Donnington*	1,699 0	199 0

* Accepted.

FEATHERSTONE (Yorks).—Accepted for the erection of school buildings, for the School Board. Mr. J. H. Greaves, architect, Corn Market, Pontefract, and 38, Albion-street, Leeds. Quantities by the architect:—

Excavator, Mason, and Bricklayer, &c.—J. Pickard 10, Dorrington-street, Leeds	£743 0 0
Carpenter and Joiner.—David Ferry & Sons, Castleford	634 0 0
Plumber and Glazier.—Geo. Thompson, Park-lane, Leeds	144 0 0
Slater.—Wm. Burton, Southgate, Pontefract	105 0 0
Plasterer.—T. Blackburn, Armley, Leeds	44 10 0
Painter.—Geo. Thompson, Park-lane, Leeds	32 0 0

FRINTBURY.—For supplementary work at Barton Court, Frintbury, Berks., for the trustees of Sir R. Vincent Sutton, Bart. Mr. Jas. H. Money, architect, Newbury:—

Hot Water Engineering Works.

W. Stainton, 131, King's Cross-road, W.C.* £214 10 0

* Accepted.

Drainage Works.

Geo. Elms, Marsh Benham £361 16 0

KINGSWEAR (Devon).—For providing and laying 530 yards of 3-inch cast-iron socket pipes for the waterworks, for the Totnes Union Rural Sanitary Authority. Mr. W. F. Tollit, Surveyor, Gate House, Totnes:—

Berry	£105 0	E. Distin	£77 10
Eales	94 0	Wellington	77 0
Hawking & Best	90 0	J. Way, Dartmouth*	75 9
Pike	87 0		

* Accepted.

LEEDS.—For laying, &c., about five miles main pipes; also walling, &c., for the Hunslet Union Rural Sanitary Authority (Halton and Temple Newsam Water Supply). Mr. J. H. Rhodes, Engineer, 92, Albion-street, Leeds:—

Pipe Founders' Work.

The Birtley Iron Co.	£1,194 4 7	Stanton Iron Co.	£1,079 2 6
Jas. Oakes & Co.	1,191 9 7	Cochrane, Grove, & Co.	1,046 18 0
Clapham Bros.	1,168 14 6	Clay-cross Co., Clay-cross, Chesterfield*	1,041 15 10
Butterley Iron Co.	1,125 7 0		
E. & W. Haley	1,107 0 0		

* Accepted.

Valves, Hydrants, &c.

Palantine Engineering Co. (informal)	£201 16 6	The Glenfield Co., Kilmarnock*	£90 4 6
Clapham Bros.	115 15 0	J. Blakeborough & Sons	78 4 6
Guest & Churnes	100 17 7	Hamilton, Woods & Co.	71 2 3
Whitley Partners	98 8 10		

* Accepted.

Pipe-laying.

Henry Ashwell	£1,359 7 0	Henry Wilson, Great Horton, Bradford*	£798 13 9
Joseph Speight	1,299 6 0	William Dolman, (informal)	784 1 2
Henry Marvel	1,164 14 0	Josiah Dale, (informal)	757 16 0
Towler & Speight	1,023 11 3	Jno. Goft (informal)	660 4 5
J. Ackroyd & Son	940 17 10		
Solden Hepwell	915 0 0		
J. & T. Young	850 0 0		

* Accepted.

LISBELLAW (Fermanagh).—For taking down and re-building the church tower. Mr. Thos. Elliott, architect, Enniskillen:—

Collin Bros.	£800	R. Pursley, Enniskelien*	£500
J. Harvey	596		

* Accepted.

LLANDEILO (Wales).—For the erection of a country residence for Mr. Wm. Harries, Cae Mawr, Llandilo. Mr. J. W. Jones, architect, Llandeilo:—

Evan Jones	£420	David Evans	£395
D. H. Jones	405	Walter Thomas	405
Thomas Bros., Llandilo*	395	James & Evans	489

* Accepted; the proprietor supplying the lime, water, sand, and doing all the excavations.

LONDON.—For the re-construction and extension of Laundry buildings at the South Eastern Fever Hospital, New Cross, for the Managers of the Metropolitan Asylums Board. Mr. T. W. Aldwinckle, architect. Quantities by Messrs. W. H. Barber & Son:—

W. Brass & Son	£13,477 0	F. & H. F. Higgs	£11,290 0
Higgs & Hill	12,240 0	H. Wall & Co.	11,127 0
Leslie & Co.	11,663 0	W. Johnson & Co., Ltd.	11,015 0
Hall, Beddall & Co.	11,566 0	Kirk & Randall*	10,720 0
Holiday & Greenwood	11,333 0	Osborne & Co.	10,198 10

* Accepted.

LONDON.—For the erection of new cells at the Hoxton Police Station, for the Receiver for the Metropolitan Police District. Mr. J. Butler, Architect. Quantities by Mr. W. H. Thurgood:—

Groves & Son	£1,588	Lathey Bros.	£1,341
Higgs & Hill	1,454	C. Ansell	1,333
Scrivenor & Co.	1,349	Chessum & Sons	1,319
Gillingham	1,345		

LONDON.—For building a lecture hall for Queen Elizabeth's Grammar School, High Barnet, N. Mr. John Ladds, architect, 7, Doughty-street, Mecklenburgh-square, W.C. Quantities not supplied:—

F. Voller	£817 0	Batley, Son & Holness	£576 0
Willmott & Son	638 0	T. Butcher*	520 0
C. Miskin	596 0	Pavey	399 10
J. W. Woodhall	595 10		

* Accepted.

LONDON.—For rebuilding No. 10, St. Andrew-street, Holborn-circus. Mr. Lewis Solomon, architect:—

Hall, Beddall	£3,480	Scott	£2,940
Spencer	3,205	Coulsell	2,853
Godson	3,143	Downs	2,720
Holloway	3,067	Reason	2,595

LONDON.—For building new library for the Commissioners of St. Saviour's, Southwark. Mr. J. Johnson, architect, 9, Queen Victoria-street:—

Dove Bros.	£5,135	Colls & Son	£4,700
Higgs & Hill	4,911	Greenwood	4,477
F. & H. Higgs	4,880	H. L. Holloway*	4,467

* Accepted

LONDON.—For rebuilding Nos. 8 and 9, Moor-street, Soho, W. Mr. Lewis Solomon, architect:—

Scott	£2,637	Reason	£1,625
Beer	1,801	Dove	1,485
Coulsell	1,643	Roberts	1,337

NEWBURY.—For alterations and additions to "The Cricketers" public-house, The Marsh, Newbury, for the Newbury Brewery Company, Limited. Mr. Jas. H. Money, architect, Newbury:—

W. H. Taylor & Son	£324	W. H. Harrison, Newbury*	£235
Geo. Head	305		

* Accepted.

PAIGNTON.—For erecting a new vicarage house at Stoke Gabriel, near Paignton, South Devon. Mr. W. T. Allen, architect:—

Stephens Bastow & Co., Limited	£2,099	W. Trevena	£1,797
Good & Co.	1,995	T. Brooks	1,790
W. Gibson	1,895	Rabbich & Brown	1,643

ST. ALBANS.—For sewering, paving, channelling, &c., Albion-road, for the Corporation. Mr. George Ford, City Surveyor, Victoria-street, St. Albans:—

James Dickson	£303	George Capper, St. Albans	
Charles Chamberlain	250	(accepted)	£165

TETBURY (Gloucestershire).—For the construction of waterworks. Mr. T. Holloway, surveyor, Chippenham, Wilts. Quantities by the Engineer:—

	Entire Main Services Engine House, and Reservoir.	Engine, and Pumping Machinery.
Easton & Anderson	£1,028 5 6	£ — £728 0
Clay Cross Co.	1,100 7 11	975 17 7 885 0
Timmins	—	— 635 0
Waller & Co., Southwark, S.E.*	—	— 547 0
Holborow & Co.	—	— 652 0
H. Flewelling	940 0 0	613 0 0 658 0
J. W. Gardner, Tetbury*	876 12 6	— —
Crossley & Co.	—	— 864 0
Thos. Evans	1,253 10 0	675 18 0 —
Coalbrookdale Co.	—	— 792 0
Francis Brown	—	972 0 0 —
Hughes & Gotto	801 11 2	788 2 3 687 15
Mitchell & Thomson	2,442 10 0	1,135 4 5 —
Lloyd & Powell	992 9 8	761 10 9 —
J. S. Brown	924 17 3	— —
Downing & Rudman, Chippenham*	—	677 17 0 —
C. S. Hobrough	1,136 7 11	741 2 4 —

* Accepted.

Two tubed bore holes 300 ft deep, done by Messrs. Timmins, of Runcorn, under separate contract.

THATCHAM.—Accepted for new offices for Mr. Edward Mecey, at Thatcham, Berks. Mr. Jas. H. Money, architect, Newbury:—
A. Bailey, Thatcham £200 0 0

WATFORD.—For widening a bridge for the Hertford County Council. Mr. Urban A. Smith, County Surveyor, 28, Victoria-street, London, S.W.:—

Wilkinson Bros.	£1,837	Dove & Co	£1,545
Jno. Neave	1,780	F. Dupont	1,535
J. Jackson	1,750	G. Double	1,431
H. J. Rogers	1,615	Jas. Dickson, St. Albans*	1,360

* Accepted.

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J. S. (shall have attention).—W. T. P. (too late).

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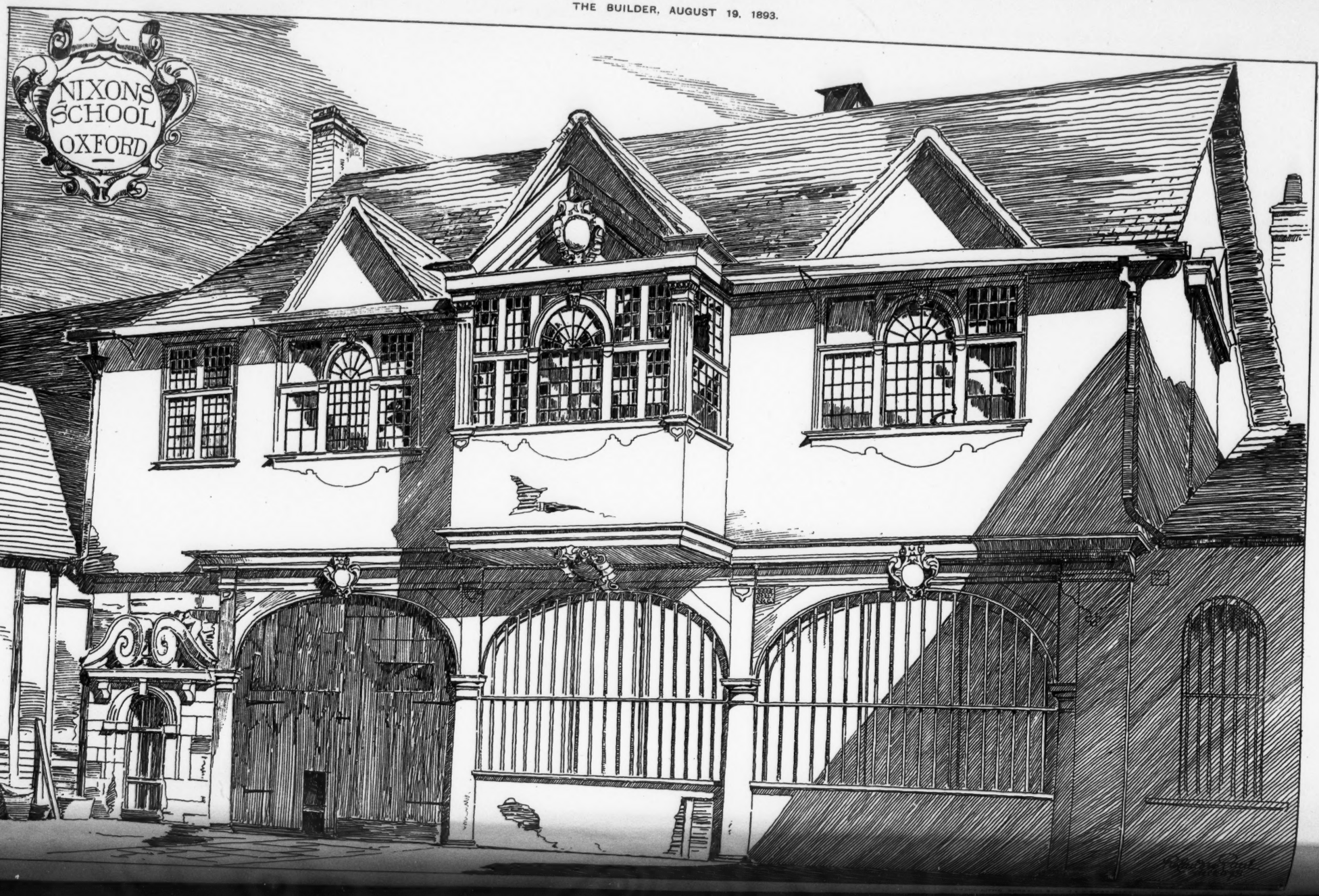
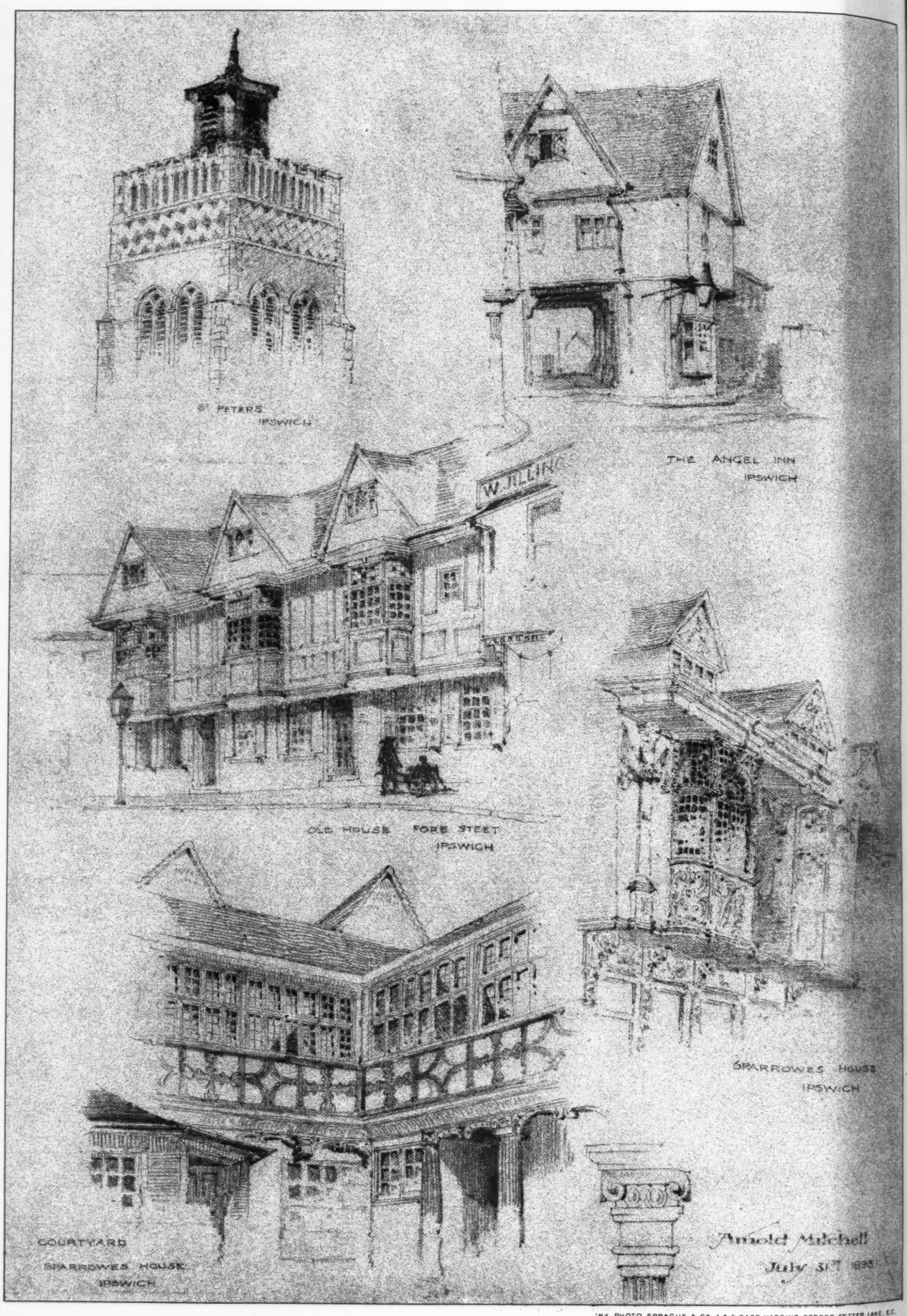

NIXONS
SCHOOL
OXFORD



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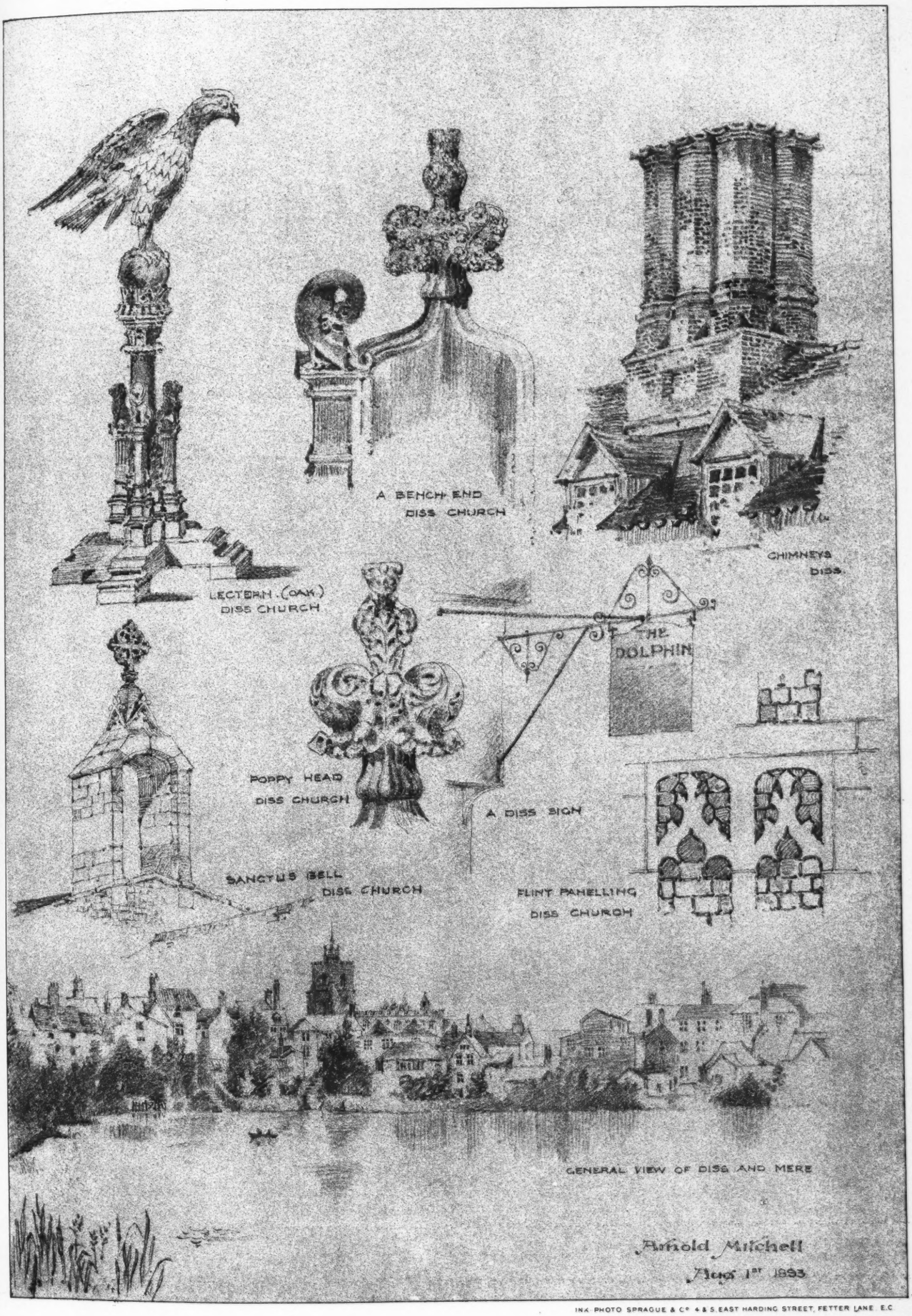
ARCHITECTURAL ASSOCIATION EXCURSION: SKETCHES ON THE LINE OF ROUTE



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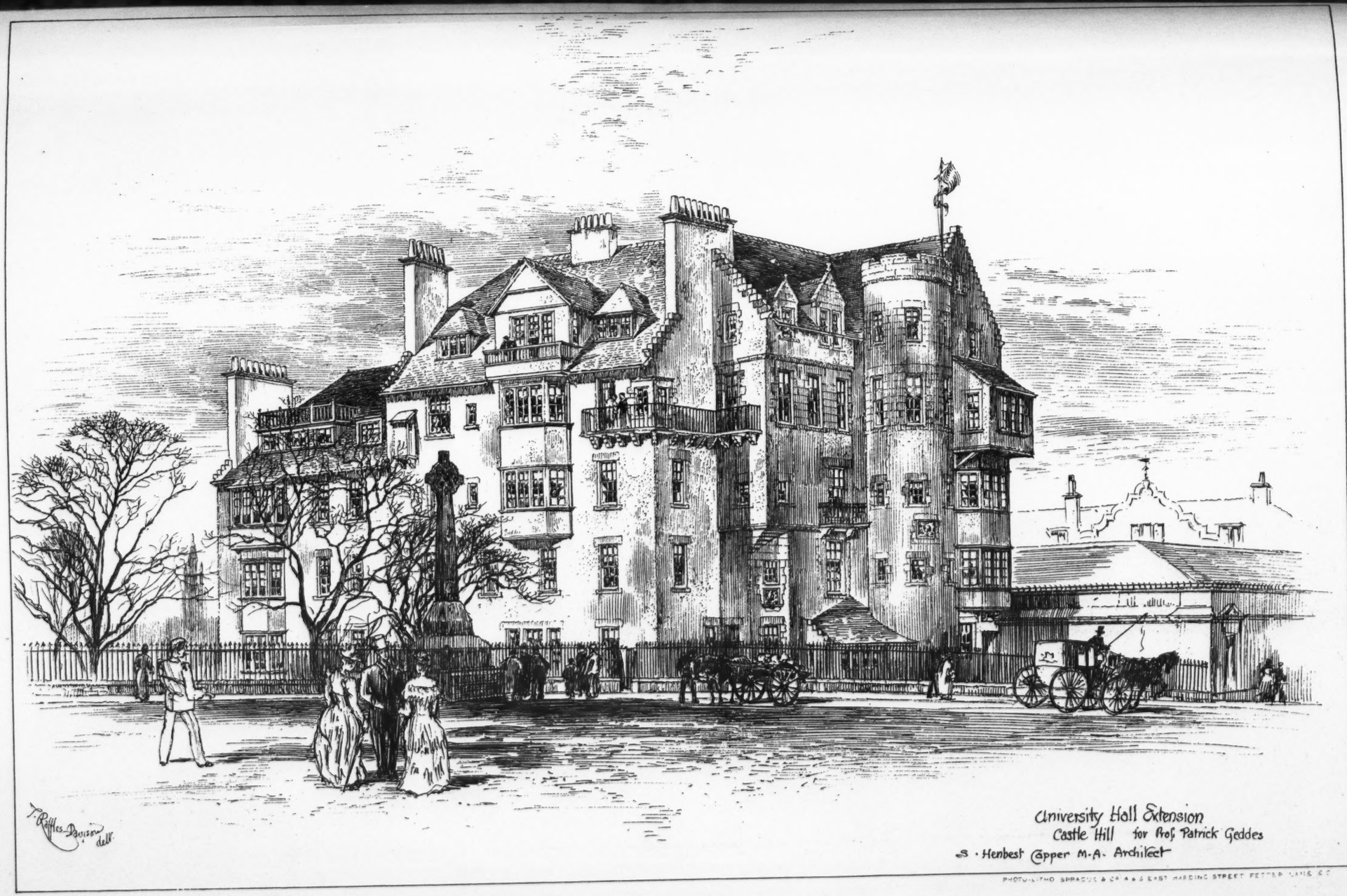
ARCHITECTURAL ASSOCIATION EXCURSION: SKETCHES ON THE LINE OF ROUTE.



University Hall Extension
Castle Hill for Prof. Patrick Geddes
S. Henbest Capper M.A. Architect

T. Raffles-Davison delt.

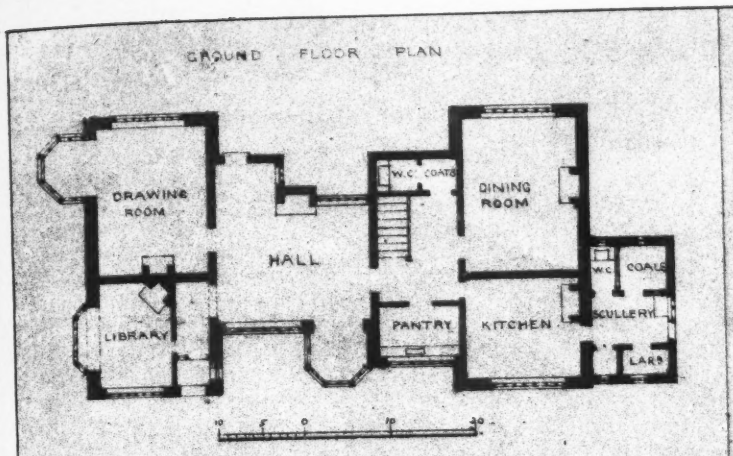
PHOTO-LITHO SPRAGUE & Co. 4 & 5 EAST HARDING STREET FETTER LANE E.C.

THE NEW CITY BUILDINGS, OXFORD.—Mr. Henry T. H

Royal Academy Exhibition, 1893

IN4 PHOTO SPRAGUE & Co 4 & 5 EAST HARDING STREET FETTER LANE E.C.

OXFORD.—Mr. Henry T. Hare, A.R.I.B.A., Architect.



DESIGN FOR HOUSE (BASED ON BRAMHALL HALL).—Mr. R. A. E

Royal Academy Exhibition, 1893.

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RAMHALL HALL).—Mr. R. A. Briggs, F.R.I.B.A., Architect.